a journal for precision engineers and all users of industrial diamond and other hard materials

INDUSTRIAL DIAMOND REVIEW

incorporating INDUSTRIAL DIAMOND ABSTRACTS
D. S. I. R.

National Lending Library for Science and Technology.

MONTHLY 1/3 SUBSCRIPTION 15/- A YEAR

January, 1961 Vol. 21 No. 242

1961 21 (242) - (247)

4450
NATIONAL ENGINEERING LABORATORY
2 FEB 1961
LIBRARY.

AUSTRALIA
BENELUX
BRAZIL
BRITISH GUIANA
CANADA
FRANCE
GREAT BRITAIN
INDIA
ITALY
JAPAN
NEW ZEALAND
SCANDINAVIA
SPAIN
SWITZERLAND

Triefus

INDUSTRIAL DIAMONDS
TRIEFUS & CO. LTD.,
THAVIES INN HOUSE, 4, HOLBORN CIRCUS,
LONDON, E.C.1, ENGLAND
Telephone : FLEet Street 9741 Cables : Triefus, London

DIAMOND PRODUCTS
TRIEFUS INDUSTRIES LTD.,
MANOR ROYAL, CRAWLEY, SUSSEX, ENGLAND
Telephone : Crawley 2244 Cables : Triefus, Crawley
DRILL BITS DIAMOND TOOLS
DIAMOND MICRO-POWDERS

INDUSTRIAL DIAMOND COMPANY (SALES) LTD.

DIAMOND POWDER

- We offer a 24 hour delivery service
- Orders for specific sizes accepted at no price uplift
- Our prices are highly competitive and credit facilities are available

ENQUIRIES INVITED

88/90 · HATTON GARDEN · LONDON · E·C·1

Telephone: HOLBORN 2642/2247 *Telegrams:* IDECE, LONDON

To secure efficiency

You know the tremendous importance to your work of the truing and dressing of your abrasive wheels. The choice of the right tool is vital.

The selection of the correct diamond for the particular work that tool has to do is our responsibility. Our unqualified acceptance of the fact and our realisation of the responsibility account for the unquestionable success of JKS Diamond Abrasive Wheel Dressers.

Our knowledge of diamonds and their multifarious industrial applications, our experience in the development of such means of production, are an assurance that we can give you precisely the right tool to secure the efficiency of your wheels at the lowest possible dressing cost.

The standard range of JKS Abrasive Wheel Dressers is designed to meet the major needs of the diamond using industries with efficiency as well as technical and commercial success.

Industrial progress, however, is always making fresh applications of the diamond, which raises new diamond tool problems. The JKS Technical Advisory Service exists not only to solve such problems on a basis of economic production, but also to make its own individual contributions towards industrial diamond development. Our experts are precision engineers versed in every phase of diamond tool manufacturing practice, as well as in the practical application of the tools within the industries to which they are supplied.

These men work with a background of some 60 years of industrial diamond development. They know their job, from diamond mine to the diamond's latest industrial application. It is not too much to say that they are already working on the way diamonds will be applied tomorrow.

That is the kind of service at your disposal when you come to JKS for Abrasive Wheel Dressers. You obtain an expert consultative service as well as a singularly efficient and very comprehensive diamond tool manufacturing organisation which has established an enviable reputation for friendly, expert, practical co-operation.

The customer's working costs and interests come first with JKS.

By courtesy of Landis Lund Ltd.

J. K. SMIT & SONS

DIAMOND TOOLS LTD.

22/24 Ely Place, Holborn Circus, London, E.C.1. *Telephone* : *HOLborn 6451

2, St. John Street, Deansgate, Manchester. 14, Queens Road, Coventry. Works : Mochdre, Colwyn Bay, Denbighshire.

Murray Hill, New Jersey, U.S.A. . CANADA . HOLLAND . FRANCE . AUSTRALIA

DIAMANT BOART

DIAMOND IMPREGNATED TOOLS
ARE USED ALL OVER THE WORLD

Wheels

Saws

Drill Bits

Truing and dressing tools ∴ Hones Boring Crowns
Dental Tools

74, avenue du Pont de Luttre, Brussels, Belgium

Sole representative in U.K.: **F. Yorke & Partners Ltd, Lassell Street, Greenwich London, S.E.10**

DIAMOND TECHNOLOGY

by Paul Grodzinski

800 pages: 500 illustrations: 94 tables.

CHAPTERS

Chapter 1—Technology of Machining Methods.
Chapter 2—Dividing Diamonds and Gem Stones.
Chapter 3—Bruting.
Chapter 4—General Survey of Grinding and Polishing.
Chapter 5—Grinding and Polishing Gem Stones.
Chapter 6—Grinding and Polishing Diamond.
Chapter 7—Drilling and Boring Holes.
Chapter 8—Carving and Engraving.
Chapter 9—Diamond Powder—Its Production and Use.
Chapter 10—Polishing Gem Stones for Jewellery.
Chapter 11—Manufacture of Watch and Instrument Jewels.
Chapter 12—Manufacture of Diamond and Sintered Carbide Dies.
Chapter 13—Industrial Diamonds, Selection and Orientation.
Chapter 14—Setting Diamonds in Tools.
Chapter 15—Grinding and Lapping Sintered Carbides.
Chapter 16—Production of Piezo-Electric and Optical Crystals. Bibliography. Appendix.

From your Booksellers or the Publishers. Price 52/6d, by post 55/-

N.A.G. PRESS, LTD., 226, LATYMER COURT, LONDON W.6.

$10 in U.S.A. and CANADA, distributed in U.S.A. and CANADA
by Huebner Publications Inc., 1975, Lee Road, Cleveland, Ohio.

Exporters

WOLVERHAMPTON
DIAMOND DIE
& TOOL CO. LTD.

ALL GRADES OF
BOARTS AND INDUSTRIAL DIAMONDS

11 HATTON GARDEN LONDON E.C.1

TELEPHONE HOLBORN 3017 CABLE PARDIMON LONDON

indusmond

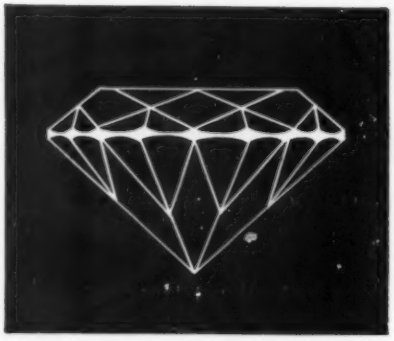
have moved . . .

Three years ago we started to plan our own office block to house all our growing activities. A year ago we started building and now, at last, we are in occupation.

Our factory remains at Barnet, our Northern Office in Sheffield, but now INDUSMOND can offer, you, and our ever growing number of customers, a better than ever service for all your diamond tool and wheel requirements.

MEMFAGIMAL HOUSE, 26-29 ST. CROSS STREET, HATTON GARDEN, LONDON, E.C.1.
Telegrams : Memfagimal Cent London. Telephone : CHAncery 7608

Selected rough diamonds and specially graded diamond powders

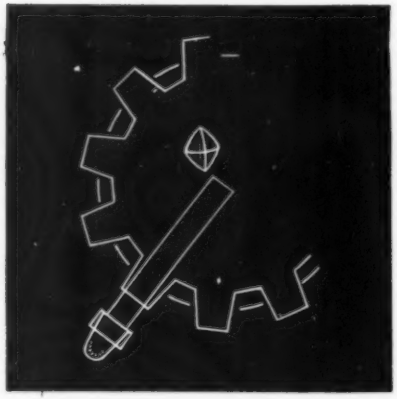


d. drukker & zn. n.v.

specialists in sorting & cleaving

Our new method of diamond sorting will give you new possibilities to get the right materials for the right job.

diamonds in art and industry



We present you our private exhibition covering the industrial and the artful use of diamonds.

If you are interested in our products please visit our works.

amsterdam - holland

12 sarphatikade

phone: 67321

gems - industrials - powder - tools

ask for our new export plan

INDUSTRIAL DIAMOND REVIEW

Vol 21 No 242
January 1961

Editor-in-Chief :
Eric M. Bruton

Managing Editor :
Patrick Greene

★

© 1961 *N.A.G. Press Ltd.—All rights reserved.*

PRINCIPAL CONTENTS

Generally Speaking — **Adamant** — 5

A Good Look at the Design, Use and Care of Diamond Cutting Tools — **J. Taeyaerts** — 6

New Form of Grinding, Cheaper, Faster, Closer — **H. E. Robison** — 13

Diamonds are this Job's Best Friend — 17

★

Industrial Diamond Review is published monthly at 1s 3d per copy, and is obtainable through newsagents and booksellers or by postal subscription (15s yearly, post free). Subscriptions in the United States of America are $2.50, and can be entered through the usual subscription agencies or direct through the publishers :—

N.A.G. Press Ltd
226 Latymer Court
London W.6.
(Telephone : RIVerside 2143).

★

Contributions of scientific, technical and practical interest, and news items, are invited, but responsibility cannot be accepted for the safety of MSS, drawings, photographs or other matter submitted. Material not accepted will be returned.

★

All editorial communications should be made to the Managing Editor at
2 Charterhouse Street
London E.C.1
(Telephone : FLEet Street 1577)

Printed by
Martin's Printing Works Ltd., Berwick-upon-Tweed, England

Generally Speaking

As You Like It

With the start of another new year, the Industrial Diamond Review hopes to be able to continue and to improve its services to its readers, and to that end requests any comments that might be made on its production so far. For example, do readers prefer a number of fairly short articles, or one long one as the principal contents of each issue? Do they prefer long articles to be published where possible in one section, or to be serialized, and if serialized, what should be the maximum period over which they should extend? Are the very down-to-earth workshop articles preferred to the more scientific, or is the mixture of both liked, and if so, is the proportion considered to be right at present?

The answers to these questions and any other criticisms will be welcomed by the Editor, since they will help in producing a publication that is best suited to its readers' needs.

Centralized Information Services

Under the auspices of the Organization for European Economic Recovery an international service of information has been set up by the European Productivity Agency to assist the smaller firms in obtaining technical information. Application under this scheme should be made to the Specialized Information Section, European Productivity Agency, 3, Rue André Pascal, Paris 16e. The collated results of individual queries are giving rise to a very useful collected body of information that can provide a sound background for a general information service covering a wide variety of techniques.

ADAMANT.

A Good Look at the Design, Use, and Care of Diamond Cutting Tools.*

by

Jan Taeyaerts

The merits of diamond cutting tools are very well known. Their ability to produce the smoothest, mirror-like surfaces, highest precision tolerances, and their high productivity on very abrasive materials, has been demonstrated on many occasions. The purpose of this paper is not, therefore, to sell diamond turning as such, but to discuss the tool geometry and use and care of diamond cutting tools, so that greater benefits yet may be derived from them.

Characteristics of Diamond

To understand why diamond tool geometry must be different from carbide or ceramic tool design, we must first understand the diamond better.

Diamond cutting tools are able to perform these critical jobs because diamond is the hardest material known to man—it will resist abrasion to the utmost. It has high compressive strength. This means that its position to the work will remain unchanged whether the tool is cutting or resting. Identical tool positions will be duplicated. Tool wear is extremely slow. This helps the attainment of high precision standards. Diamond is a mineral that can be polished to a high degree of lustre. It resists metal welding at the cutting edge to the extreme. All these factors make it an ideal cutting tool material for these various critical functions.

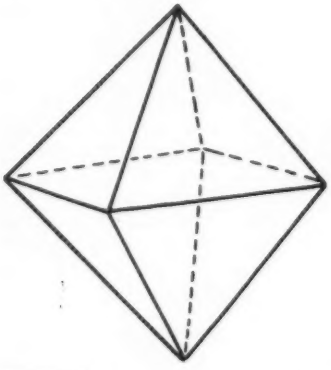


Fig 1. Octahedron crystal. This is the basic and ideal shape for a diamond.

Fig 2. Dodecahedron type crystal. One of the growth stages of an ideal diamond.

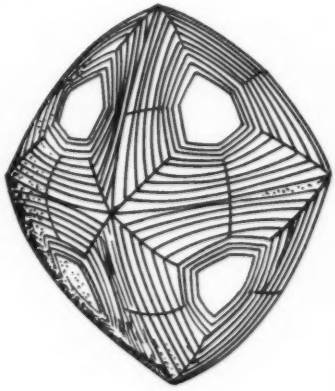


Fig 3. Dodecahedron. An ideal basic shape.

Diamonds, however, have a great weakness. Although extremely hard, they are very brittle, which is the main reason why special tool geometry must be adopted. The diamond is a crystal, and its atomic structure is such that it can easily be cleaved.

To familiarize ourselves with the normal growth habits of diamond crystals, let's quickly review some of the ideal crystal shapes (figures 1, 2, and 3). All of these crystals indicate different growth stages, the sharp octahedron crystal (figure 1) being the basic shape.

Very few diamonds are as perfect as any of those shown. Most diamonds show deformations of some kind. They may be flat, long, very thin

Reprinted with permission from Carbide Engineering 1960 Vol 12 (6) pp 14-18 (June)

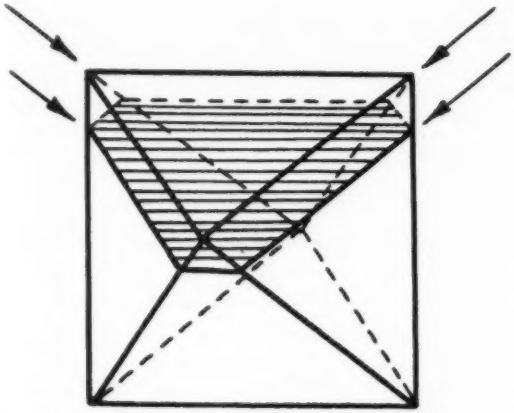


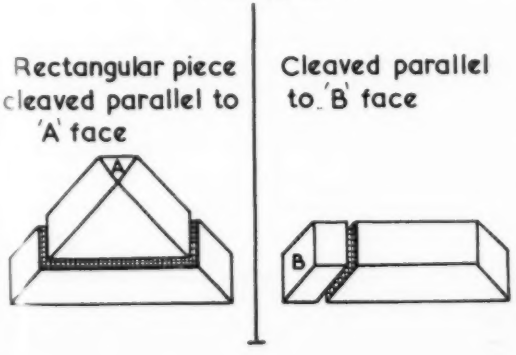
Fig 4. A cleavage plane of an octahedron parallel to one of the octahedron faces.

and long. They may grow intertwined and then we see twin crystals. They may be cleaved and broken during the cooling cycle when diamonds were formed, or in their mining process. All these outward very different shapes have one thing in common, their basic crystal structure and their ability to be cleaved.

Review again the ideal octahedron crystal (figure 1). The cleavage plane in all instances is parallel to the 8 faces of the octahedron (figure 4). This very crystal could, therefore, be cleaved in flat pieces as shown. This flat piece could be further cleaved into elongated shapes and finally into small crystals being a miniature of the original crystal (figure 5).

The normal included angle of two intersecting faces of an octahedron is approximately 70 degrees. If we now design a tool at 60 degrees

Fig 5. This shows how Fig 4 would be cleaved into flat pieces. It could be further cleaved into elongated shapes and finally into small crystals which would be miniatures of the original.



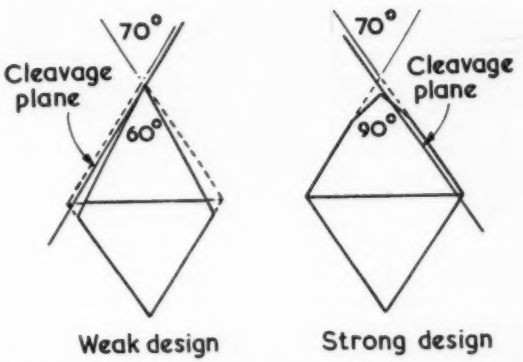


Fig 6. The 60 degree tip could be easily fractured, while with 90 degrees the damaging cleavage angles are avoided.

you immediately notice that the very tip of such a tool can easily be cleaved off or fractured off under cutting pressure. On the other hand, if the same tool is designed at 90 degrees the damaging cleavage angles are avoided (figure 6). In this instance the atoms are buttressed one against the other while in the first instance they lose all buttress strength.

Rules to Follow

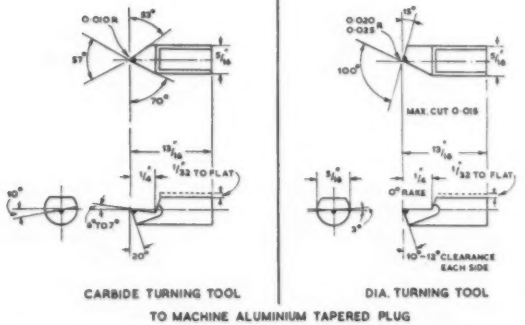
Rule 1: This is the basic and the first rule that will guide all diamond tool design. All clearance and rake angles should be designed as obtuse as possible. The ideal angle would be a total to 90 degrees or more in any direction.

Furthermore, the diamond cutting tool should never be absolutely sharp. It should be designed with as large a radius as possible. Since the diamond is expected to wear insignificantly, due to its resistance to abrasion, we need not allow for this radius to widen and break down, such as is common with cutting tools of other materials.

Rule 2: Design the radius just short to the maximum permitted radius of the finished part print. If the print calls for a maximum 0.015 in. radius, design the diamond at 0.012 in.

Rule 3: Design the tool with minimum clearances and rakes. The ideal cutting tool strength will be attained with a zero rake. Wherever the job requires the chip to be directed for any reason whatsoever, 3° to 5° positive and side rakes are permitted. Some high finish jobs can be achieved with a negative rake, maximum 20 degrees. However, it must be borne in mind that at that point the cutting pressures increase considerably and negative rakes, can therefore, only be applied on extremely light cuts and on relatively soft materials.

A few examples are now in order. Figure 7 represents a boring tool designed to turn a tapered plug $\frac{7}{8}$ in. minimum diameter to $1\frac{1}{2}$ in. maximum diameter of free machining aluminium, to be finished at 15 micro inch. Compare the diamond to the carbide tool design. Notice how the included angles have been opened up, side rake reduced and radius increased. This job is running on a Heald Boromatic at 2300 RPM.



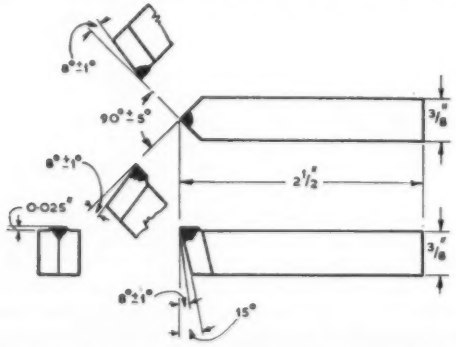
TO MACHINE ALUMINIUM TAPERED PLUG

Fig 7. Notice how the diamond tool's included rake angles have been opened up, side rake reduced and radius increased when compared to the carbide tool.

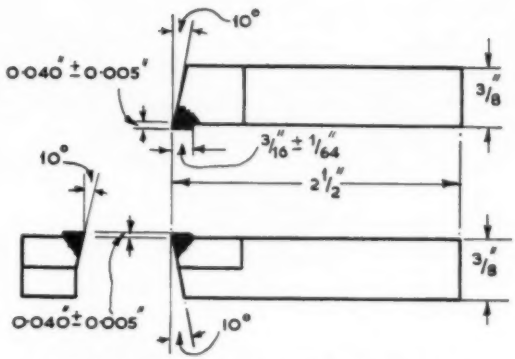
Figure 8: This cutting tool turns an aluminium camera part on a Hardinge lathe turning at 910 feet/minute. Depth of cut 0.0065 in. It produces 9000 parts between sharpenings. Here the requirements call for a controlled surface finish over rolled-in lettering. The diamond tool cuts clean without leaving a burr, while carbide tools filled the letters and made them indistinct.

Figure 9: This facing tool is part of a multi-tool setup on a Brown and Sharp automatic.

Fig 8. This tool produces 9000 parts between sharpenings.



DIAMOND CUTTING TOOL, USED ON ALUMINIUM PARTS

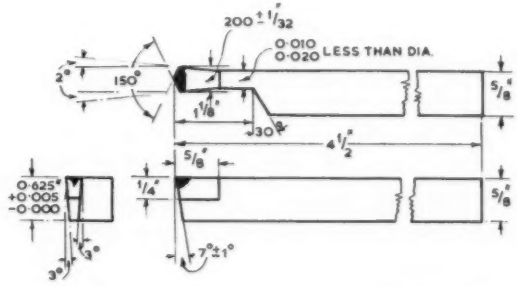


DIAMOND CUTTING TOOL TO FACE GLASS AND EPOXY RESIN PARTS

Fig 9. This facing tool is part of a multi-tool setup, and averages 6000 pieces between sharpenings.

The material to be machined is glass reinforced epoxy resin. The job runs at 800 feet/minute, stock removal 0.100 in. This tool averages 6000 parts in between sharpenings. The material is very abrasive, and carbide tools needed changing after approximately 100 parts. Also notice that in this instance, the diamond tool takes a deep cut. On plastics they can be used on rough cuts.

Figure 10: This tool is designed to cut off 8 in. diameter glass and epoxy resin tubing. Notice the 150 degree included angle of the cutting edge. This prevents the tool from drifting in the cut and the corners from breaking down prematurely. While a carbide tool may produce 1 or 2 parts, the diamond tool produces 20 to 30 parts.

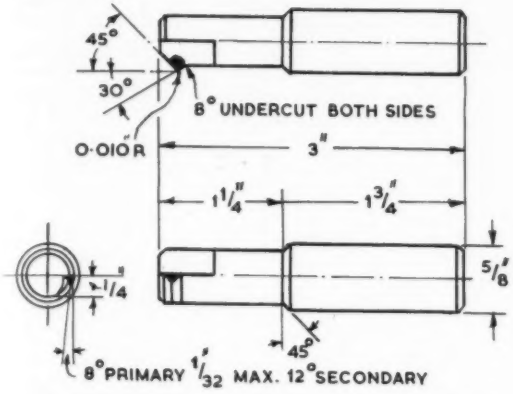


CUT OFF TOOL. GLASS AND EPOXY RESIN TUBING

Fig 10. Included angle of the cutting edge is 150 degrees, which prevents the corners from breaking prematurely.

Figure 11: This tool was mounted on a Hardinge lathe and used to bore oilite bearings, where it is recognized that surface porosity is essential. Diamond tools bring out the best

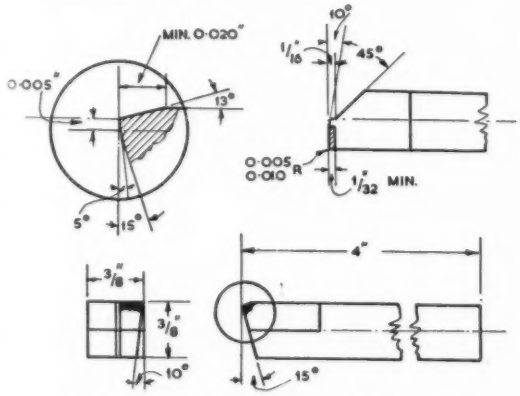
properties of this metal since, while carbide tools will close the pores, diamond tools will open them up.



BORING TOOL FOR HARDINGE LATHE

Fig 11. This boring tool was designed for oilite bearings.

Figure 12: This tool is designed to finish cut the bezel of watch cases. The negative rake produces a burnishing cut and removes only 0.002 in. of stock. The cutting edge is finished with extra care and must be free of any chips and is inspected at 100 magnification.



BEZEL FINISHING TOOL FOR WATCHCASE

Fig 12. The negative rake produces a burnishing cut.

Rule 4: The diamond cutting tool must be designed to operate on the centre line of the work. If used below the centre line it will dig into the work and cause extreme pressure at the cutting edge (Figure 13). If used above centre the front clearance angle must be increased. Both instances would reduce tool life considerably. On work larger than 1 in. diameter, the diamond

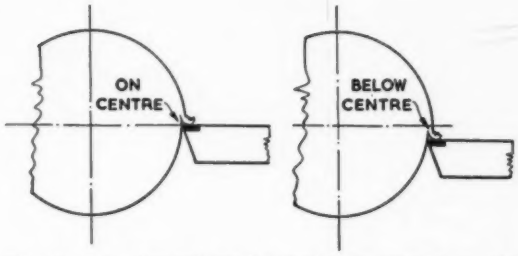


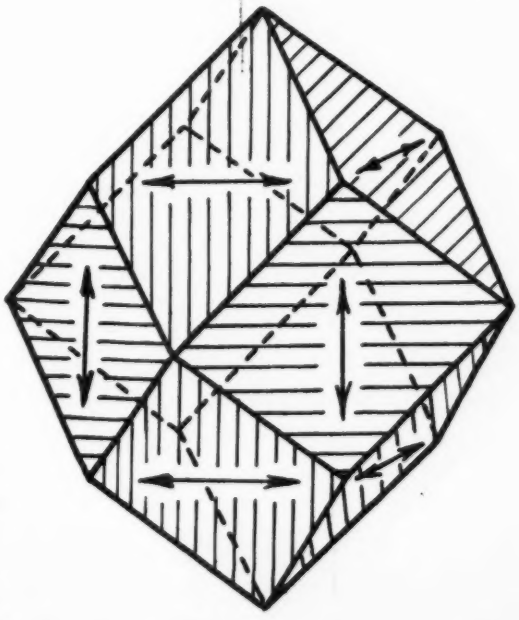
Fig 13. The diamond cutting tool must operate on the centre line of the work to avoid extreme pressure at the cutting edge.

cutting tools may be positioned a maximum of $^{1}/_{100}$ of the work diameter above the centre.

Rule 5: The location of the cutting edge relative to the bottom of the tool should be constant. This permits the setup man to locate the centre line without the aid of any instruments. It is therefore advisable that an extra tolerance be added to conventional prints, limiting the height location of the diamond relative to the bottom of the tool. Tolerances of minus 0.000 in. to plus 0.005 in. should be common practice.

Rule 6: Always keep in mind that the diamond is a relatively delicate cutting tool. We should protect it in every way possible. Therefore

Fig 14. Arrows point to the softest wear directions. Perpendicular to these directions is the hardest wear direction.



provide husky shanks for the tool so that any vibration may be prevented.

A common mistake is made on diamond boring tools. The job may have been run with small carbide tools mounted in a boring bar. They may be only $\frac{1}{8}$ in. or $^{5}/_{32}$ in. diameter. The diamond must be mounted on the centre line leaving only $\frac{1}{16}$ in. or $^{5}/_{64}$ in. of metal to secure the diamond in, which is not enough. It would be better to redesign the boring bar to allow at least a $\frac{1}{4}$ in. shank, and preferably a $\frac{3}{8}$ in. shank to support the diamond.

Rule 7: Resharpen the diamond when it starts to become dull. This will avoid breakage and increase the number of resharpenings and therefore maximum tool life.

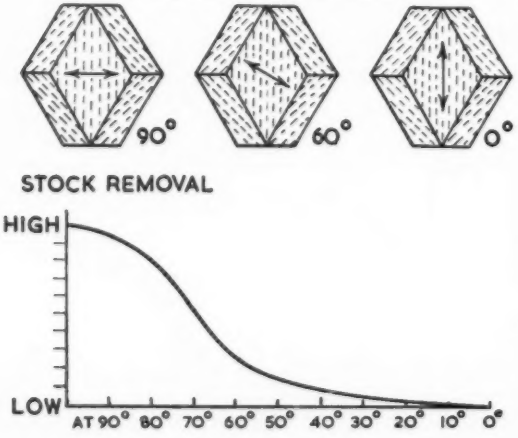
Orienting Diamond Tools

A study of proper diamond tool geometry would not be complete without talking about the proper grain geometry of the diamond itself. The diamond is a crystalline material, and atomic structure results in a definite grain pattern. We find that a diamond at a given point will wear better in one direction than in another.

Figure 14: This is a dodecahedron; the arrows point to the softest wear directions. Diamond cutters take this into account when they cut or polish diamonds. Perpendicular to these soft directions is the hardest wear direction of the diamond at that very point.

Figure 15: This chart indicates the curve of anticipated wear, indicating high wear in a direction perpendicular to the grain direction, a drastic reduction at 60 degrees to the grain direction and practically no wear thereafter.

Fig 15.. The curve of anticipated wear. High wear perpendicular to the grain direction, practically no wear after 60 degrees to the grain direction.



After we have protected the diamond fully by proper tool design, we must protect it for wear, particularly on very abrasive materials. It stands to reason that if the cutter will mount the diamond in the tool in its most favourable position, much greater life can be expected than when it is mounted with random orientation.

Two methods can be used to orientate the diamond properly. Skilled diamond cutters can do it by eye within useful tolerances. A more advanced technique and more accurate method would be to orient the diamond by X-ray. When an X-ray is projected through the diamond it is noticed that a definite pattern of light dots appear on the screen. Depending on the X-ray being directed through one of the three major optical axes this pattern varies.

The X-ray technique, therefore, permits the tool maker to identify the exact grain direction in the diamond in relation to the cutting force. Once this has been established, other tools can be duplicated. X-ray will now be a means to inspecting a new tool and to help the tool maker in orienting the diamond as required.

No doubt, the ultimate of tool life can be achieved by this X-ray orientation method, although it has its limitations. It is costly to produce. Such a tool would definitely be a single purpose tool, and could not be used on parts that are to be worked on different cutting planes. That would change the chip flow and, therefore, distort the diamond. The tool position must be predetermined and strictly adhered to, because to do otherwise would again distort the diamond.

Conclusions on Tool Design

It is rather obvious that diamond cutting tools should be specifically designed for a given job, even more so than either carbide or ceramic cutting tools, since the clearance angles are more critical. To design a tool properly we must start from the work part print. We must also know—

1. Type of machine to be used.
2. Maximum shank size
3. Finish required
4. Range of feeds and work speeds available.

Diamond boring tool designers must have additional information on the type of bar that is available.

If the tool must be oriented, the tool designer will further need to know the positioning of the tool in the machine relative to the work within 2 degrees tolerance.

Continued on page 12

50 Years

1961 marks the Golden Jubilee of The Carborundum Company Ltd., at Trafford Park, Manchester, an occasion which the company greets with some pride.

During these "first fifty years of progress with industry", CARBORUNDUM has grown to become the nation-wide, household name that it is to-day.

Expansion has taken place alongside that of British industry, and we are indeed proud to have co-operated in the many developments that have taken place.

Now, we brace ourselves to an even greater challenge, the requirements of advanced technology necessitating new techniques and materials. With this in mind, we are confidently moving forward to the "next fifty years".

Manufacturers of

Abrasive Grains
Bonded Abrasive Products
Coated Abrasive Products
Super Refractories
Ceramic Cutting Tools

1911 - 1961

THE CARBORUNDUM COMPANY LTD
TRAFFORD PARK, MANCHESTER 17

Telephone: TRAfford Park 2381 *Telegrams:* CARBORUND, TELEX, MANCHESTER

Materials Suitable For Diamond Turning and Diamond Boring

I. Metallic Materials:

Light metals-Aluminium, Magnesium Alloys, Duraluminum, and others.
Soft metals-Copper, Brass, and Zinc Alloys.
Bearing metals-Babbitt Metal, Bronze.
Precious metals-Silver, Gold, Platinum.

Diamond tools can be expected to produce 10 to 15 times the number of parts compared with tools made with other materials.

Successful cast iron and steel applications are rare. They should only be attempted when carbide tools have functionally failed to obtain either desired finishes or tolerances. Even then diamond cutting tool costs are expected to be high.

II. Non-Metallic Materials:

Soft Rubber-Platens for type writers, rolls for printing machines
Hard Rubber-Ebonite in fountain pens.
Plastic Materials-Phenol-formaldehyde, urea resins, cellulose acetate, etc.
Compressed Graphite-Electrodes
Composite Materials-Paper calendar rolls
Ceramics
Carbon
Glass reinforced epoxy resins

In some instances diamond tools will produce 20 to 50 times more than carbide tools.

Use and Care

Let us bear in mind that diamond cutting tools are fragile precision tools. They should be handled in the same manner as micrometers, precision instruments, and gauges. Cover the cutting edges with a rubber or plastic covering when they are not at work, and store them in separate containers when they are removed from the machine.

Even the slightest pressure or shock when brought into contact with steel parts may fracture the cutting edge and make the tool useless. Therefore the setup men should exert extreme caution. Use copper shimstock in between the diamond and the anvil of micrometers when a boring tool is mounted for proper diameter. Do the same between the tip of a height gauge and the diamond when lining up the diamond on the centre line in a lathe setup.

Diamonds should be used on good solid and fast machine tools. Any vibration will shorten the tool life considerably.

Never bring the diamond into contact with the work in a stationary position or stop the machine in the cut. High speed will reduce the cutting edge pressure. Slow motion will increase it and cause the diamond to fail.

Each material has its ideal operating speed. It can be said, however, that 250 to 350 feet/minute should be the minimum on any material. There is no maximum speed known at this time. Mr P. Grodzinsky in his book " Diamond Tools " cites the example of diamond tools operating at cutting speeds of 10,000 feet/minute. The condition of the machine will determine its maximum potential cutting speed. It never should vibrate.

Here now are some basic operating data:

Cutting Speeds:
Metals—200 to 10,000 feet/minute
Non-metallic Materials—100 to 3,300 feet/minute

Feeds:
Metals—0.0008 in. to 0.004 in./revolution
Non-metallic Materials—0.0008 in. to 0.020 in./revolution

Cutting Depth:
Metals—0.0005 in. to 0.024 in.
Non-metallic Materials—0.0008 in. to 0.060 in.

Recommended Cutting Speeds on Light Weight and Soft Metals

Aluminum Alloys—
650 to 1,000 F.P.M.
Pure Aluminum—
800 to 1,150 F.P.M.
Magnesium Alloys—
1,000 to 1,250 F.P.M.
Cast Bronzes—
500 to 1,000 F.P.M.
Lead Bronzes—
1,650 to 2,000 F.P.M.
Babbitt Metals—
800 to 1,150 F.P.M.

Conclusions

The metal working industry requires better finish and designs products to much closer tolerances than ever before. Automation requires tooling material that will perform consistently and for a long duration. New materials appear on the market and bring with them new machining problems.

The operation of diamond cutting tools is also widening. Diamonds help the tool engineer to meet these unusual requirements. Many new applications are worked on daily. We now use diamond cutting tools where we never thought them practical before.

*New Form of Grinding, Cheaper, Faster, Closer**

by

H. E. Robison**

A new form dressing method that has kept dimensional tolerances within 0.0005 of an inch for more than a year, and almost eliminated time formerly spent in dressing tool set-up and dressing operations, proves to be a single solution for four major form grinding problems. Close dimensional tolerances, lost production time, scrapped parts, and cost of dressing tools and grinding wheels are fundamental worries for management in the grinding industry.

The basic idea has been around for a number of years, but until recently its potential has barely been tapped. Every day new shapes and new developments of grinding wheel form dressing tools are taking the place of former less efficient methods.

The real breakthrough has come with the introduction of the Tru-Grit rotary diamond-set form dressing wheel. The shaped rotary diamond grit wheel gives a greater degree of accuracy and consistency of reproduction throughout the life of the dressing wheel than was possible by any other dressing method. Additionally, applications that never before could be done in a single operation are now not only possible but are practical and more efficient than previous methods.

Fig 1. The Tru-Grit rotary diamond-set form dressing wheel is powered independently from the grinding wheel. A single dressing unit may combine several rotary dressing wheels to permit simultaneous dressing of several grinding wheels.

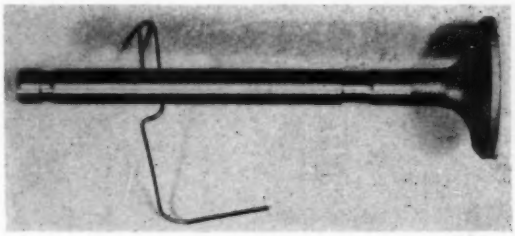


Fig 2. Uniformity in reproduction of work parts is one of the important advantages of dressing grinding wheels with Tru-Grit rotary form dressing wheels. This automotive valve has a groove with one square edge, one bevelled, with the end of the stem bevelled.

Rotary dressing wheel

The dressing tool is powered independently from the grinding wheel. This permits greater flexibility in application, finer control, and easy adaptability to full automation. Direction of the grinding wheel in relation to the rotary diamond dressing wheel is relatively unimportant, except that surface speeds may not be identical in the same direction. Dressing is accomplished by abrasive action at full grinding wheel speed, with a resulting gain in production time. Power for the dressing wheel is usually provided by an electric motor through a flexible shaft.

No basic change of the machinery is required to adapt it to the use of the new rotary dressing wheel except a modification of the electrical and hydraulic circuitary to accept the dressing wheel unit. Normally only one unit is required per machine.

The wheel is presently manufactured for forms up to 2 in. wide for wheels of any diameter. It is possible to dress wider wheels with multiple set up of dressing wheels. This must be under the guidance of a manufacturer's engineer.

Application

On a valve grooving operation at one automobile plant, four machines had been equipped with three single diamond dressing tools per machine. Original forming of the grinding wheel was a lengthy process. When any one of the dressing tools on a machine wore out or became broken, all three had to be replaced. Cost of a

* Reprinted with permission from *Grinding & Finishing* May 1960.

** President of the Wheel Trueing Tool Company.

Fig 3. Grinding wheel has been removed to show location of Tru-Grit rotary diamond-set form dressing tool. Power is supplied to Tru-Grit through flexible shaft driven by independent motor mounted on top of grinding machine. Cylinder at upper left controls infeed of dressing wheel. Direction of rotation of dressing wheel in relation to grinding wheel is immaterial, providing surface speeds are not identical in the same direction. True-Grit dresses by friction, not by pressure, removing approximately 0.001 inch of stock during each dressing operation.

single tool was $20 and an average of six tools per day was consumed on the two shifts. In addition, an hour of set up time was required per shift, an average of two hours stolen from potential production time each day.

After the original forming of the grinding wheel, production continued during subsequent dressing with the 3 single diamond tools. Each dressing took about a minute, and parts that were being ground during that time tended to fluctuate in form as the dressing progressed, resulting in some scrapping or regrinding. An average of 18 pieces per minute were produced. Original forming was accomplished in a fraction of the time, because the entire surface was dressed at one time in comparison to the time required for the 3 single diamond points to traverse the surface.

Dressing with the Tru-Grit wheel requires 2½ seconds and is accomplished ' between parts,' or in the non-productive parts of the machine cycle in which the part is being ejected and the next part is fed into grinding position. There are no scrap parts as a result of this dressing during production.

Original cost of the Tru-Grit dressing wheels ranged from $600 to $800. This was more than offset by their long life. Under normal work conditions, one diamond grit wheel lasts a year or more, resulting not only in a saving in dressing tool costs but also in elimination of set-up time. With two hours of production time per day recovered at an average of 18 pieces per minute, the production potential for the four machines today is increased by more than 600,000 parts annually and scrap from variations during dressing has been eliminated.

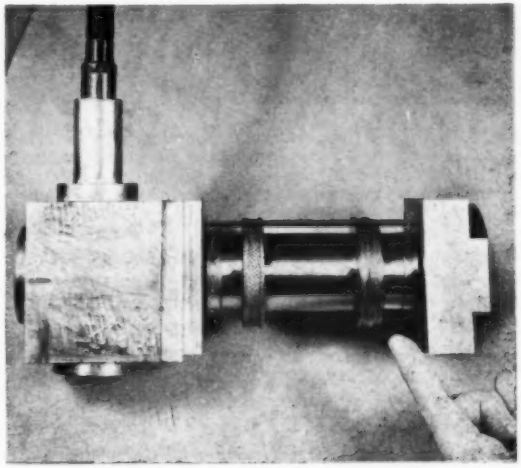
Uniformity of form in high production operations is the most important single factor contributing to the reduction of parts' costs through the use of these rotary diamond dressing wheels. Tru-Grit wheels are particularly well suited to automation, although just as easily adaptable to manual applications.

Volume controls how often a grinding wheel must be dressed and how long a wheel will last. In an application similar to the one described earlier, life of the grinding wheels was increased 50 per cent by equipping the machines with rotary diamond dressing wheels.

Two spaced grooves were required to be ground into the valve stem at another automotive plant. The old method required two machines one for each groove. Redressing of the grinding wheels was accomplished with single diamond tools during the time that grinding was being done, contributing to slight variations in the grooves and substantial scrap loss.

Minor alterations were made to the grinding machine to accommodate two grinding wheels and a double wheel Tru-Grit rotary diamond dressing unit was added. With the modified equipment, both grooves were ground simultane-

Fig 4. Only one of two Tru-Grit wheels in this dressing unit had to be replaced to accomplish certain engineering changes on one of the two grooves ground into an automotive valve stem.



ously on a single machine in 3½ seconds. Dressing of the grinding wheel was accomplished during the time that parts were changing. Production was not interrupted nor were parts scrapped because wheels were not dressed during the grinding action of the wheel.

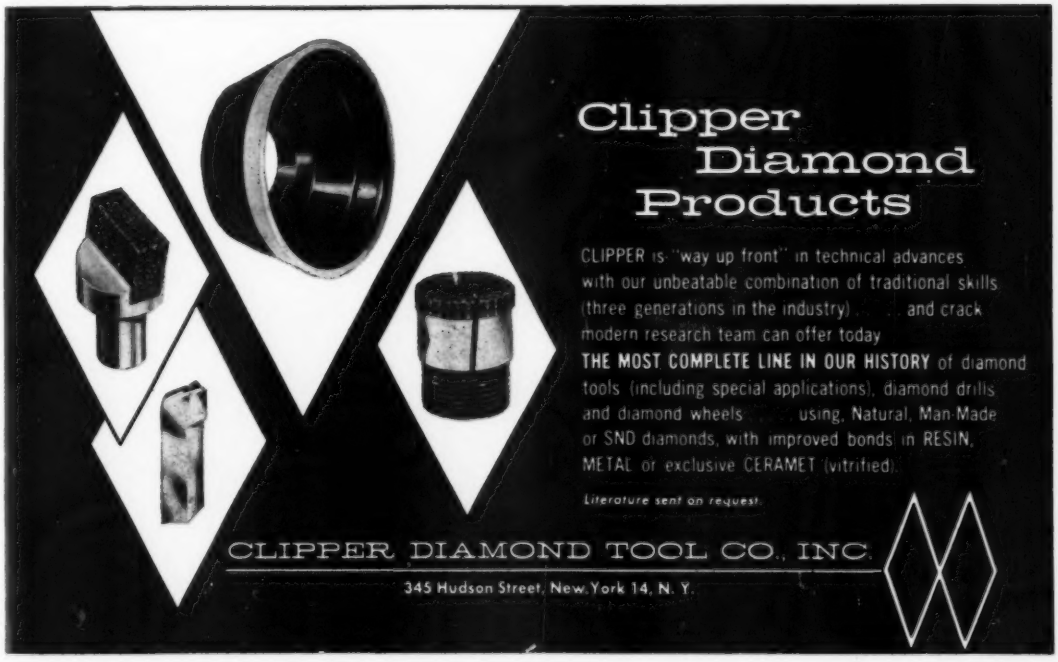
Less stock is removed in each dressing operation to recover the original form as the complete form is developed by the wheel, thus, the life of the grinding wheel is increased. The rotary dressing tool also gives a uniformity of dressing due to the uniformity of the dressing wheel as compared to single part dressing. The consequent grinding of machine parts or equipment components is to a greater degree of accuracy than ever before.

Square grooving

Square grooving is just one more area in which this dressing has provided an answer to a problem. Under old methods, square grooving of some parts was done by machining. Use of the rotary dressing wheels with proper selection of wheel grading can now produce a square groove of 90° corners. The harder and tougher steels used today make the turning operation of yesterday impractical or too costly.

With the introduction of rotary diamond-set form dressing wheels, the grinding of more

Fig 5. Production is often simplified by using Tru-Grit rotary diamond-set form dressing wheels. Cutoff, chamfering and bevelling is accomplished in one operation in the production of this valve.


Clipper
Diamond
Products
CLIPPER is "way up front" in technical advances with our unbeatable combination of traditional skills (three generations in the industry) and crack modern research team can offer today
THE MOST COMPLETE LINE IN OUR HISTORY of diamond tools (including special applications), diamond drills and diamond wheels using, Natural, Man-Made or SND diamonds, with improved bonds in RESIN, METAL or exclusive CERAMET (vitrified).
Literature sent on request.
CLIPPER DIAMOND TOOL CO., INC.
345 Hudson Street, New York 14, N. Y.

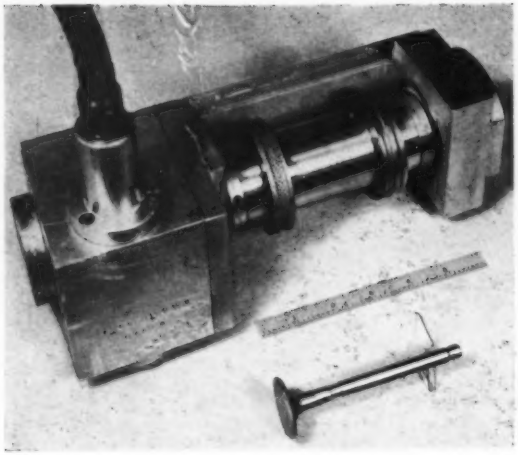


Fig 6. Two grinding wheels on a single machine are dressed simultaneously with this two-wheeled Tru-Grit rotary diamond-set form dressing tool. Uniformity of reproduction of a part with widely spaced grooves is assured when both grinding wheels are dressed with a single unit.

intricate configurations is possible. More intricate forms often result in combining several dressing and grinding operations into a single operation, with higher volume of production and better uniformity. Users have found that square grooving today is done faster, easier, and more accurately with multiple grinding wheels dressed with rotary diamond dressing wheels.

In grooving and forming a part for an airplane engine, a centre-type grinder was used with two separate grinding operations. Grinding wheels were dressed by single diamond dressing tools. Crush forming was ruled out in this instance by square grooving and bevel forming requirements. Now, with a single machine, the multiple surface and angle configuration of this complicated part is produced in one grinding and one dressing operation, using a composite Tru-Grit rotary form dressing wheel. The original cost for the Tru-Grit wheel of $600 is greatly offset by long life expectancy, reduced set up time and reduced labour.

The Tru-Grit rotary wheel minimizes or eliminates many of the problems which have been costing grinding departments a good deal of money. It has changed manufacturing procedures because of its speed and accuracy in developing simple or complex forms on any grinding wheel. It eliminates crush roll forming semi-finish form grinding in many instances and, in processing harder metals, offers the possibility of fast, economical, accurate grinding instead of turning to shape.

The MSE Pressure Coolant Unit

The MSE Pressure Coolant Unit provides a means of supplying high pressure coolant through gun drills, gun reamers, and other cutting tools. On fine boring machines the fine feeds necessary for deep hole work are available and in these conditions the tools can be power fed; the unit is, however, quite suitable for use on standard machine tools such as radial type drills, capstans, and centre lathes where, if necessary, the tools can be hand fed.

Coolant from the machine tool is collected into a reservoir which is more often than not the existing coolant tank. Through the line strainer the coolant is passed through a filter in the unit to remove fine particles of foreign matter. In this condition it passes into a pressure pump which delivers the coolant to a toolholder which is mounted on the machine tool. The drill or cutting tool is held in the toolholder and the coolant is fed, under pressure, through an axial hole to the cutting point.

The unit consists of a portable metal carrying case which has a filter and pump unit with a $\frac{1}{4}$ horse-power motor and delivers coolant at 70 gallons per hour at 400 lb/in^2. Inlet and outlet hoses of generally suitable lengths are provided. Two types of toolholder are available, one for fixed tools and one for rotating tools. These can be stored in a separate compartment in the unit when not in use.

Diamonds Are This Job's Best Friend

As conventional abrasives were unable to stand up to the job of machining tough ceramic parts, Raytheon Mfg Co invested in a $13,000 natural diamond wheel which paid for itself in less than a year.

Diamond grinding to 0.00025 in.

Components made from hard ceramics—aluminium oxide, titanium dioxide, barium titanate—are used in a wide variety of shapes in microwave systems, radar equipment, vacuum tubes, missiles, and other devices where part tolerances are critical. At the Raytheon Mfg Co's Waltham plant, the largest parts machined are 4¾ in. diameter cylinders; the smallest parts are 0.008 in. thick disks. Diamond grinding must produce tolerances of 0.00025 in. on some of the jobs handled at Waltham.

Natural diamond rather than synthetic

The high thermal shock resistance and toughness of hard ceramics enables them to withstand the effects of the 300+ megacycle waves generated by microwave systems. Having chosen the material to be used, Raytheon engineers experimented to find the best machining method. The tests showed conventional abrasives to be uneconomical, whereas diamond wheels gave good results in both production and quantity. Five automatic grinders were equipped with metal-bonded natural diamond wheels in sizes from 25 to 220 mesh. Natural diamond was preferred to synthetic diamond as it is less friable and shows no tendency to crumble under the impact of ceramic grinding.

Raytheon engineers turned to diamond after extensive trials had shown them to be more economical, in the long run, than other

COMPENTRAD LTD

FOR

DIAMOND IMPREGNATED TOOLS

CONTINUOUS RIM CUTTING DISCS - SEGMENTED DISCS UP TO 3.METER DIAMETER - GRINDING WHEELS - CUP WHEELS - STRAIGHT WHEELS - PENCIL EDGING WHEELS

THE BEST TOOL FOR THE JOB

TEL. MONARCH 1257
9768
9769

31, THROGMORTON STREET
LONDON, E.C.2

materials. This indicates the growing importance of tool and material selection in any production process.

Fig 1. Mandrel-mounted disks being ground on the 24 in., $13,000 diamond wheel.

Diamond wheel performance

Diamond wheel performance can be illustrated by examining the case of a ceramic component in a magnetron tube. The part is a 2.129 in. OD aluminium oxide cylinder with a tollerance of ±0.001 inch. About 0.090 in. of material had to be ground from the OD to bring it to the required size; the ID was not critical and needed no machining after sintering. The job was originally given to an outside contractor who used

Fig 2. Grinding ceramic parts for a magnetron assembly.

conventional abrasives to trim the cylinders. Costs became prohibitive—more than $1 per cylinder for the grinding operation alone—and production was slow and often unsatisfactory; wheel wear was rapid and rejects high.

Raytheon then equipped a Cincinnati centreless grinder with a special diamond wheel. The wheel, costing $13,000, is 24 in. in diameter and has a 4 in. face; it operates at 1,750 rev/minute. Put to work on grinding the cylinders it produced the following results: a 25-fold increase in production, a reduction of cost to a fraction of that for contracted work, a 30% reduction in scrap, improved and more consistent surface finish, reduced number of grinder settings owing to low wheel wear.

After a full year of use, during which the wheel paid for itself, virtually no wheel wear was shown. During the twelve months, no truings or dressings were required.

Fig 3. Disks and plates bonded to a steel plate for horizontal grinding on a Blanchard machine, using diamond wheels.

News in Brief

The 1961 import licensing schedule released by the Hon. R. Boord, New Zealand Minister of Customs, provides further easing of allocations for a wide range of imported goods. About £240 million is provided for private import payments. A total of 206 items are now designated ' R ' and new items in this category include precious and semi-precious stones.

The Israeli Minister of Industry and Commerce, Pinhas Sapir, stated recently that it was planned to expand the diamond workshop in Eilat from 40 to 60 workers and to set up another diamond workshop.

A new diamond field of small dimensions has recently been discovered in South Kalimantan, Indonesia, by inhabitants of Darapan village, near Bandjarmasin's Ulin airport. Among the stones found was a 12 carat diamond with an estimated value of 1 million rupiahs.

The Spanish authorities have published a second list of liberalised goods—including industrial diamonds—which may be freely imported, with effect from May 1st 1960, without import licences, provided they originate in, and proceed from, O.E.E.C. and other specified countries. The imports must be made under an ' Import Statement covering Liberalised Goods,' to be made by the importer on official forms.

British Precision Diamond Tools, Ltd., has recently introduced the Jearum Mk.V universal diamond lapping machine which can be employed for producing chisels points on diamond tips, to extremely close tolerances. This machine has been developed over a period of several years, and its design is based on extensive experience gained with prototype machines.

The first diamond polishing factory in Israel's new development town of Ashdod, near Ashkelon, was opened recently at a ceremony attended by Michael Tsour, Director-General of the Ministry of Commerce and Industry, and Oved Ben-Ami, Chairman of the Ashdod Development Corporation.

The plant was erected at a cost of some I£200,000 and will employ about 70 people. According to Mr. Ben-Ami, Ashdod will eventually have diamond polishing works with some 400 workers.

THE HENDERSON DIAMOND TOOL COMPANY LTD.,

43-45 ALLESLEY OLD ROAD, COVENTRY

Telephone : Coventry 75617

MANUFACTURERS OF DIAMOND TOOLS.

ALL TYPES OF ABRASIVE DIAMOND TOOLS

RESET AND RETURNED WITHIN **48 HOURS**

OF RECEIPT AT THE ABOVE OFFICE.

TOOLS FOR SPECIALISTS MADE TO CUSTOMERS OWN REQUIREMENTS

CLASSIFIED ADVERTISEMENTS

2d. *a word, minimum* **4/-.** *Box Numbers* **1/-** *extra.*

Address Box No. replies to : N.A.G. PRESS, LTD., 226 Latymer Court, London, W.6.

TIME RECORDERS.—Sales—Rental Service. Tel. HOP. 2239. TIME RECORDER SUPPLY & MAINTENANCE CO. LTD., 157/159 Borough High Street, London, S.E. 1.

MR. M. DAVIDSON, F.S.M.C., qualified opthalmic optician, is in constant attendance, for sight-testing and dispensing of optical prescriptions, at the HATTON OPTICAL CO., 19 Hatton Garden, E.C.1. (Tel. HOL 8193).

JEWEL BEARINGS for watches, precision industries and the jewellery trade—high grade quality—very competitive prices. Sawing, drilling, enlarging, turning, recessing of synthetic ruby and sapphire, germanium and other hard materials. We are interested in being represented in other countries. S. I. CARDANA, ORNAVASSO (NO.), ITALY.

DIAMOND POWDERS, purity 98% +, recovered from diamond cutting and polishing powder (0 — 40 micron) for $2 (U.S.) crt. DIACEM, Schupstraat 9, ANTWERP, BELGIUM.

DIAMOND TOOLS by Paul Grodzinski. The application of Diamond in Industry. 379 pages, illustrated. 20s, by post 21s 6d. N.A.G. PRESS, LTD., 226 Latymer Court, London, W.6.

WANTED: Toolmaker's microscope, second-hand, Taylor Hobson microscope bodies, goniometer and similar equipment. Best cash prices paid. DIAMOND EXCHANGE & MART, 57 Aspenlea Road, W.6.

CASH ! Highest prices paid for diamond fragments and used boart. DIAMOND EXCHANGE & MART, 57 Aspenlea Road, W.6.

THE GEMMOLOGIST. A journal for everyone concerned with gems and minerals. Scientific, practical and historical articles on gemstones and minerals with accent on identification and research. Subscriptions 12s. p.a. ($2.00) post free, from **N.A.G. PRESS, LTD.,** 226 Latymer Court, London, W.6.

MODERNISE your works—Trade in your Autoflow glass working machines in part exchange against modern S. & M. models. DIAMOND EXCHANGE & MART, 57 Aspenlea Road, W.6.

THE DIAMOND NEWS

and

SOUTH AFRICAN JEWELLER

(Official organ of S.A. Jewellers Association, Ltd.)

The Voice of the Diamond Industry

Subscription Rates, per annum 33/- (Post free)

For information on Rates and spaces available, write :—

Advertising Manager,
P.O. Box 361,
KIMBERLEY,
South Africa.

ADVERTISERS' INDEX

	Page
Carborundum Co. Ltd.	11
Clipper Diamond Tool Co. Inc.	15
Compentrad Ltd.	17
Diamant Boart	2
Diamond News, The	20
Drukker, D. & Zn. N.V.	4
Habit Diamond Tooling Ltd.	Cover II
Henderson Diamond Tool Company, Ltd., The	19
Impregnated Diamond Products Ltd. ...	Cover IV
Indusmond (Diamond Tools) Ltd	3
Industrial Diamond Co. (Sales) Ltd. ...	Cover II
Smit J. K. & Sons (Diamond Tools) Ltd ...	1
Triefus & Co. Ltd.	Cover I
Wolverhampton Diamond Die & Tool Co. Ltd.	3

o

● PUBLISHERS : N.A.G. PRESS, LIMITED
226 Latymer Court, Hammersmith, London W.6, England Telephone : RIVerside 2143

o

Contributions of scientific, technical and practical interests and news items are invited, but responsibility cannot be accepted for the safety of MSS, drawings, photographs or other matter submitted. Unaccepted matter will be returned.

o

Information of Rates and spaces available for Trade Advertisements will be forwarded on request. I.D.R. is published monthly on the 18th at 1/3 a copy. It is obtainable through Newsagents and Booksellers, or by Postal Subscription, 15s. a year post free, from the Publishers' address above.

Subscriptions in U.S.A $2.50 are received by the usual U.S.A. Subscription Agencies or direct from the Publishers, address as above.

INDUSTRIAL DIAMOND ABSTRACTS

Industrial Diamond Information Bureau,
2 Charterhouse Street, London, EC 1.
Telephone : FLEet Street 1577

1961 Volume 18
JANUARY

DIAMOND MINING AND INDUSTRY

Need for new diamond mines

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (6) pp 3-4 (Aug)

A general survey of the development of diamond resources with an assessment of the present position. 1 illustr. *D* *Eb Hd.132*

New diamond fields planned by Union Government [:] Land in Namaqualand and Vanrhynsdorp for controlled prospecting

Anon. *Diamond News* 1960 Vol 24 (1) p 32 (Oct)
D *Eb.12.361*

De Beers plan synthetic diamond output

Anon. *The Times* 1960 (54697) p 11 (Oct 8)

Mr. H. Oppenheimer, chairman, De Beers Consolidated Mines Ltd, announced in London on Oct 7, 1960, that De Beers is to start manufacturing synthetic diamonds in South Africa by setting up facilities for producing the diamonds on a large scale. The decision was not prompted by any acknowledgement that synthetic diamond as such is superior to the natural material, but by the jeopardizing of industrial diamond supplies because of confused conditions in the Congo, Ghanian reports of Government decisions to nationalize foreign companies, and the fact that the republican victory in South Africa may affect foreign investment.
D *Fh Ha.25.361*

Five countries are producing synthetic diamonds. Fünf Länder erzeugen synthetische Diamanten

Anon. *Gold u Silber* 1960 Vol 13 (12) p 42 (Dec) (In German)
K *Fh Ha*

Native labour and payment on Premier Diamond Mine

E. J. B. Sewel. *J S Afr Inst Min Metall, J'burg* 1960 Vol 61 (2) pp 110-119 (Sep)

11 illustr.
D *Hd.1453.361/Hd.252.361*

Treatment and recovery practice at Kimberley mines of De Beers Consolidated Mines, Limited

E. Colvin, H. S. Simpson. *J S Afr Inst Min Metall, J'burg* 1960 Vol 61 (2) pp 120-123 (Sep)

Additional discussion stimulated by the paper is reported. 2 illustr.

See *Industr Diam Abstr* 1960 Vol 17 p A210 (Sep).
D *H.3612/Hg.3612*

Ore-dressing notes [:] Treatment of blue ground

E. Colvin, H. S. Simpson. *Min Mag, Lond* 1960 Vol 103 (4) pp 219-221 (Oct)

Digest of a paper describing methods of treating blue ground at Kimberley and reviewing changes in concentration methods since the development of the rotary washing pan in 1874.

See *Industr Diam Abstr* 1960 Vol 17 p A210 (Sep).
D *Ebd H.3612*

Treatment plant and diamond recovery at the Premier Mine

R. I. Shanks. *J S Afr Inst Min Metall, J'burg* 1960 Vol 61 (2) pp 90-109 (Sep)

Plants described include sorting and crushing, screening and washing, the jig plant, heavy-medium separation and grease table recovery plants. A further advance in testing for diamonds, being developed at the Diamond Research Laboratory, is a photo-separator. Diamond sorting is covered and other topics are tailings and slime disposal. 17 illustr.
D *H.361/Hg.361*

How diamonds are found and mined in Africa. Pt II

A. F. Daily. *World Min* 1960 Vol 13 (11) pp 36-41 (Oct)

This second article defines and describes kimberlite, which yields 85% of the total mined, and is the source of all diamonds but alluvial deposits. Details are given of stripping and mining techniques and operations at alluvial deposits are covered. (To be cont). 7 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A301 (Oct). *D* *Ebb Hd.36/Ebb.12.36*

Diamonds in the Great Lakes area—a geological enigma

C. H. Smith. *Canad Min J* 1960 Vol 81 (7) pp 51-52 (July)

Seventeen diamonds, varying in size from ½ ct to 21 ct, were found in the glacial drift of Wisconsin, Michigan and Ohio before 1899, but the parent pipes have never been discovered and whether the source area lies in Canada or the United States is unknown. It is suggested that certain indicator minerals such as pyrope should be sought in the glacial drift and traced to their source by pleistocene studies. Such a prospecting programme has been used in Russia, for pyrope and diamond occurs together in kimberlite pipes and pyrope is far more abundant and easier to recognize. 1 map, 4 ref.
L *Ebb.12.341*

CONTENTS

Diamond Mining and Industry...	A1	Rock Drilling	A16
Physical, Chemical, and Mechanical Properties of Diamond	A3	Grinding and Polishing of Carbides and Metals	A17
		Machining Developments	A22
Physical, Chemical, and Mechanical Properties of Hard Materials	A4	Production, Grading and Recovery of Abrasive Particles	A23
Diamond, etc, in Instruments	A5	Tool Production...	A24
Hardness and Wear Testing	A7	Powder Metallurgy	A26
Truing of Grinding Wheels	A8	Miscellaneous	A26
Precision Machining of Metals	A11	Book Reviews	A27
Cutting and Machining of Stone, Glass, etc ...	A13	Trade Literature	A28
Gem Polishing	A15	Patent Lists	A29

Nyasaland not linked in Diamond Chain

Anon. *Diamond News* 1960 Vol 24 (1) p 5 (Oct)

A survey sponsored by De Beers Co has led to the conclusion that Nyasaland is not linked to a possible diamond chain stretching from Kimberley to Tanganyika. *D* *Eb.12.363*

Longlands pothole still going strong

Anon. *Diamond News* 1960 Vol 24 (1) p 30 (Oct)

See also *Industr Diam Abstr* 1960 Vol 17 p A269 (Nov). *D* *F.12.3612*

Diamond discovery on Phangnga and Phuket, South Thailand

P. Aranyakanond. *Report of Investigation, Royal Dept of Mines, Bangkok, Thailand* 1955 (1) pp 35-36 (In English)

During a survey of tailing minerals at tin mines, two diamonds weighing 0.335 and 0.347 ct were found. Genesis and occurrence were uncertain as the diamonds were not actually found in rock.

D *Eb.12.37*

Has Australia a future as diamond producer ?

Anon. *Diamond News* 1960 Vol 23 (12) pp 3, 5 (Sep)

It is concluded that while there are certainly diamonds in Australia, whether they occur anywhere on a South African scale seems doubtful on the evidence collected over a century. However, modern prospecting methods could reveal a remarkable kimberlite pipe.

D *Eb.12.38*

Scottish gem localities

A. M. Ramsay. *Gemmologist* 1960 Vol 29 (352) pp 208-215 (Nov)

No gem diamond has been found in Scotland and, in fact, it is still disputed whether any diamond at all has been discovered. Various reported finds of small crystals are mentioned. 1 illustr.

D *Eb.12.321*

Prospect for development of the meridional Yakutsk basin. Perspectives de mise en valeur du bassin de Yakoutie meridionale

I. S. Bredikhin. *Prospection et Protection du sous-sol* 1960 (3) pp 1-5 (Mar) (In French, original in Russian)

1 iilustr, 1 table. *A* *Eb.132.332*

Metamorphism of carbons in the meridional Yakutsk basin. Metamorphisme des charbons du bassin de Yakoutie meridonale

A. I. Chelebaeva. *Prospection et protection du sous-sol* 1960 (3) pp 5-8 (Mar) (In French, original in Russian)

2 illustr. *A* *Eb U.332*

The diamond deposits of Yakutia

N. W. Wilson. *Min Mag, Lond* 1960 Vol 103 (4) pp 205-213 (Oct)

Digest of a book published in Moscow in 1959 which gives much new information as well as many re-interpretations of facts already known. Exploration and recovery, geological location, geological age and search methods, kimberlite types and xenoliths, mineralogy and diamond classification are considered.

See *Industr Diam Abstr* 1960 Vol 18 p A2 (Jan).

D *Eb.12.332*

Diamond mining in the capitalist countries

I. Tomskaia. *Mir ekon i mezhdunar otn* 1960 (6) pp 146-148 (June); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1907 (Sep) (Original in Russian)

D *F Hd*

USSR's exploitation of new fields

Anon. *Diamond News* 1960 Vol 23 (12) p 7 (Sep)

Commercial exploitation of diamond-carrying kimberlite deposits has begun in the Daldyn River area in Yakutia, close to the Arctic Circle, according to *Tass*. It is said that a dressing plant and other installations have been built on the banks of the river, drilling rigs have been erected and many roads are being built to link the field with towns in Northern Siberia. The field is one of ten kimberlite pipes discovered in the area last September. *D* *Ebb.12.332*

Diamond mining in the USSR

G. A. Vvedenskii. *Vest Inst po izuch SSSR* 1960 (1) pp 38-50 (Jan/Mar); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1907 (Sep) (Original in Russian)

D *F Hd.33*

G.E.C. of U.S.A. congratulates De Beers

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (6) p 4 (Aug)

Refers to successful production of synthetic industrial diamonds by De Beers Consolidated Mines Limited.

D *Fh Ha.361*

Secrecy order rescinded

Anon. *Diamond News* 1960 Vol 23 (12) p 9 (Sep)

Announcing the granting of patents on its process and apparatus for making synthetic diamonds, GEC stated that a Government secrecy order prevented the company from filing patent applications in many foreign countries until 1959.

D *Fh Ha.545:.253*

Congo diamond supplies uninterrupted

Anon. *Diamond News* 1960 Vol 23 (12) p 28 (Sep)

D *F.13.365*

Hong Kong is world's biggest diamond smuggling centre

Anon. *Diamond News* 1960 Vol 24 (1) p 15 (Oct)

D *F.2598.372*

Old Kimberley 're-discovered' [:] News revealed by old newspapers

C. B. Harris. *Diamond News* 1960 Vol 23 (12) pp 13, 15 (Sep)

D *Eb.28.3612*

Old Kimberley re-discovered [:] Debris washers made fortunes in the early days of the fields

C. B. Harris. *Diamond News* 1960 Vol 24 (1) pp 20-21 (Oct)

1 illustr. *D* *Eb.28.3612*

Ninety years of Kimberley mining

Anon. *Diamond News* 1960 Vol 24 (1) pp 23-25 (Oct)

A general survey of the development of the area.

D *Eb.132.3612*

The early occurrence of diamonds

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (6) p 2 (Aug)

A brief account mentioning some of the earliest references to mining and uses of diamond.

D *Eb Hd.28*

IDB in Basutoland

Anon. *Gemmologist* 1960 Vol 29 (352) p 215 (Nov)

There has been little official news of the development of the diamond deposits known to exist in Basutoland, but there are indications that a fair quantity of diamonds are now being produced there, and that not all of them are being sold through legitimate channels.

D *Eb.132.361*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF DIAMOND

Developments and highlights at the Gem Trade Lab in Los Angeles [:] Diamonds

L. B. Benson jun. *Gems & Gemology* 1960 Vol 10 (2) pp 45-46 (Summer)

Three white diamonds displayed what appeared to be a bluish adularescent effect, which was found to result from a combination of minute impurities in the stones and bluish fluorescence excited by visible light.

Three pink diamonds, weighing 0.18, 0.50, and 0.51 ct, were checked to verify characteristics of pink stones as reported recently by G. R. Crowningshield, B. W. Anderson, and Dr. Guebelin. As expected, the stones changed colour when subjected to X-radiation, the change being somewhat in proportion to the depth of colour and in a manner described here. All specimens reverted to their original colours when exposed to an incandescent light plus slight heating for about 5 minutes. Other observations are made. 3 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A163 (July). *D* *F Gbd U/F Gbk Hx U*

Developments and highlights at the Gem Trade Lab in Los Angeles [:] Audio conduction detector

L. B. Benson jun. *Gems & Gemology* 1960 Vol 10 (2) pp 49-50 (Summer)

Acting on the discovery of the Diamond Research Lab, Johannesburg, that natural blue diamonds are electro-conductive, a simple conductometer was constructed at the Los Angeles Lab with which natural blue diamonds could be separated from bombarded or blue coated stones. Operation is described. 2 illustr.

D *F Gba Uec*F Gba Hx Uec/F Uec Vfd W*

Developments and highlights at the Gem Trade Lab in New York

G. R. Crowningshield. *Gems & Gemology* 1960 Vol 10 (2) pp 59-63 (Summer)

The author mentions that an almost colourless diamond may occasionally fluoresce a distinct yellow, thus making it a grade lower in daylight than in incandescent light: this is the reverse of the blue-fluorescent diamonds. 3 illustr.

D *F Gba Ukp*F Gbb Ukp*

Identifying artificially coloured blue diamonds

Anon. *Gemmologist* 1960 Vol 29 (349) pp 145-146 (Aug)

Refers to equipment developed at the Diamond Research Lab, Johannesburg, which enables gemmologists and jewellers to differentiate between natural and artifically blue diamonds.

See also *Industr Diam Abstr* 1960 Vol 17 p A302 (Dec). *D* *F Gba*F Hx/F Ukb Vw W*

Why all these rules ?—A review of ' Blue-White '

Anon. *Guilds* 1960 Vol 15 (10) pp 1, 4 (Oct)

D *F Gba.2532*

Rivalry of nature and synthesis. Konkurrenz Natur und Synthese

Anon. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (9) p 484 (Sep) (In German)

Synthetic industrial diamonds with diameters up to 0.2 mm are claimed to have a wear ratio 40% higher than natural industrial diamonds in grinding wheels, because they have a rougher surface. Meanwhile, special methods have achieved a controlled structure in natural diamonds. *A* *Fc Unr*Fh Unr*

Synthetic diamonds uninteresting. Synthese-Diamanten uninteressant

Anon. *Dtsch Goldschmide Ztg* 1960 Vol 58 (11) p 686 (Nov) (In German)

Dr. Guebelin of Lucerne has denied that synthetic diamonds will be important on the jewellery market; General Electricio claims to have made diamonds of 1/10 ct, but Dr. Guebelin doubts whether any have been, or could now be produced larger than 1/100 carat. Furthermore, diamonds larger than this would be composed of numerous small crystals which would disintegrate in grinding; and the structure of these diamonds would show other disturbing peculiarities unsuitable in gemstones, although they improve the industrial quantities of diamonds. Dr. Guebelin attributes these characteristics to the nickel used in the production of synthetic diamonds, but which is not present in natural diamonds.

A *Fh Hn/Fh Kb*

Inclusions of diamond in diamond

C. Hegel. *Gold u Silber* 1960 Vol 13 (9) p 20 (Sep) (In German)

In Dr. E. Guebelin's book ' Inclusions as a mean of gemstone identification ' a photo-micrographic copy of such a diamond has been made. A small diamond owned by the Institut für Edelsteinforschung contains an octahedral diamond inclusion visible to the naked eye. It was photographed on the gem microscope, with lateral lighting, and magnified 30 times. 1 illustr.

A *F Gk:F Vjb Wcmd/F Gk Hkb*

Diamondiferous jottings. Diamond in dolomite : a Russian find

A. A. Menyailov, V. G. Ivanova. *' Mindrill ' Bits & Pieces* 1960 Vol 13 (6) p 6 (Aug)

The presence of an octahedron diamond in dolomite was noted during study of Yakutian kimberlites and minerals. *D* *Ec F.12.332*

The formation of the diamond

Anon. *Diamond News* 1960 Vol 24 (1) p 13 (Oct)

Simple diagrams show how diamonds were formed in Kimberley millions of years ago from carbon crystallized by tremendous heat and pressure. 8 illustr.

D *F Hb.3612*

Synthetic industrial diamonds. Diamanti sintetici industriali

Anon. *Industr Min* 1960 Vol 11 Ser II (9) p 680 (Sep) (In Italian)

Announcement by GEC Research Laboratory concerning the process, manufacture, and advantages of synthetic stones.

M *Fh Ha.342/Fh Qc.342*

Looks like a gem

Anon. *Diamond News* 1960 Vol 23 (12) p 9 (Sep)

The latest artificial diamond looks like a gem and even cuts glass, according to the manufacturer. Sizes range from 1-20 ct but larger ones are made on request.

D *F*Fh/Fh Ha*

Progress in synthetic diamonds. Fortschritte in der Diamantensynthese

K. Schlossmacher. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (9) p 484 (Sep) (In German)

Reports experimental methods used to produce synthetic diamond by the US Army and Air Force laboratories.

See *Industr Diam Abstr* 1960 Vol 17 p A184 (Aug).

A *Fh Ha.1456*

Waveforms of the lattice vibrations of diamond

V. Chandrasekharan, E. S. Rajagopal, R. S. Krishnan. *Proc nat Inst Sci India Pt A* 1960 Vol 26 pp 377-391; *Insdoc List* 1960 Vol 7 (18) col 1494 (Sep 16)

D *F Ubb*

Elastic behaviour of diamond

R. S. Krishnan, V. Chandrasekharan, E. S. Rajagopal. *Proc nat Inst Sci India Pt A* 1960 Vol 26 pp 311-319; *Insdoc List* 1960 Vol 7 (18) col 1494 (Sep 16)

D *F Unc*

Semiconducting diamonds as thermistors

G. B. Rodgers, F. A. Raal. *Rev sci Instrum* 1960 Vol 31 (6) pp 663-664 (June)

Semi-conducting diamonds should prove useful as thermistors under severe ambient conditions as diamonds are highly resistant to corrosion and abrasion, are not subject to thermal annealing except at extremely high temperatures, and will withstand extremes of pressure. A diamond thermistor was compared with an oxide thermistor regarding resistance as opposed to temperature characteristic. Diamond thermistors are expected to prove more responsive than the conventional oxide ones because of their excellent thermal conductivity and low specific heat. To make the thermistors, small cylinders of diamond were drilled out of the parent semi-conducting stone, and leads were attached to them. A loop of platinum wire of 0.01 in. diameter was attached to the diamond and the metal was secured by the bonding of a bridle of titanium-silver-copper alloy wire with the diamond. 2 illustr, 3 ref. *L* *Fn Wz*

Detecting diamonds and metals

Anon. *Financial Times* 1960 (22329) (Nov 2)

Extreme efficiency is claimed for a new portable device for detecting diamonds and other gemstones and scarce metals in soil samples: no failures, even in detecting small industrial diamonds, have been reported so far. Use of radio-isotopes eliminates the need for cumbersome X-ray equipment, and this system also has the advantage of being readily adaptable for detection of other materials.

See also *Industr Diam Abstr* 1960 Vol 17 p A211 (May).

D *Sz:Bb Cz Syb W|Sz:Bf Cz Syb W|Sz:F Hz Syb W*

The question of precision measurements of lattice parameters

M. M. Umanskii, V. V. Zubenkov, Z. K. Zolina. *Sov Phys, Crystallogr* 1960 Vol 5 (1) pp 43-47 (July-Aug) (Original in Russian)

The real accuracy of precision measurements of lattice cell parameters was recently elucidated by the Commission on Crystallographic Apparatus of the International Union of Crystallography. The same substances, *ie* silicon, tungsten, and diamond, were investigated in sixteen laboratories of different countries. The scatter in the values was 0.013%, which considerably exceeds the value of the error as reported by most authors. The present work was undertaken in connection with the results of this international investigation. Experiments and results are recorded.

D *Bfp Ubb Vfd.21|Bhc Ubb Vfd.21|F Ubb Vfd.21*

REQUESTS FROM AMERICA

American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.

Examination problems for the young goldsmith

Prüfungsfragen für den Junggoldschmied

Anon. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (11) p 682 (Nov) (In German)

One reply states that a diamond can only safely be exposed to a brazing flame if it is quite free from cracks and feathers, as the heat will widen and deepen them and may break the stone. Even perfect diamonds may become filmy. *A* *F Ubb Vbb*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF HARD MATERIALS

Summarized proceedings of a conference on X-ray analysis London, November 1959

G. J. Bullen, A. L. Mackay. *Brit J appl Phys* 1960 Vol 11 (9) pp 393-400 (Sep)

During the session on 'Structure analysis', Dame Kathleen Lonsdale described some X-ray studies of borazon synthesized in the General Electric Research Labs, New York. There is no evidence for the existence of a Wurzite form of borazon. There is macro-twinning on [111] like diamond but no micro-twinning. Stacking disorder found in the 'graphitized' borazon and in graphitized diamond are similar, but there is no evidence that this differs from stacking disorder as often found in terrestial graphite. Disorder is invariably found, even in meteoretic graphite.

A session on 'Apparatus and experimental techniques' is also covered.

D *F Vu:Swm*Re Vu:Swm*

Summarized proceedings of a conference on the borders of X-ray analysis—Reading, April, 1960

R. P. Ferrier, B. T. M. Willis. *Brit J appl Phys* 1960 Vol 11 (11) pp 481-485 (Nov)

The papers and discussion ranged over a number of subjects including neutron and electron diffraction, X-ray emission spectroscopy, and X-ray micro-analysis. 2 illustr, 28 ref. *D* *Swm Vu.231*

Growing of dislocation-free germanium single crystals

E. Yu. Kokorish, N. N. Sheftal. *Sov Phys, Crystallogr* 1960 Vol 5 (1) pp 150-152 (July-Aug) (Original in Russian)

2 illustr, 6 ref, 1 table. *D* *Bfr Vhf*

Behaviour of graphite in an electrostatic high and tension separator

K. K. Majumdar. *J sci industr Res* 1960 Vol 19B (8) pp 314-315 (Aug)

2 illustr, 2 tables. *D* *Bhb Cce U*

Radioisotopes broaden the approach to machining studies

M. Pabliobagis, E. J. Krabacher (Cincinnati Milling Machine Co). *Tooling & Prod* 1960 Vol 26 (7) pp 6, 8, 12, 16, 22, 27, 30 (Oct)

A comprehensive survey of the development of uses and techniques of radio-isotopes as a research tool in industry concludes that, while the radioactive tool wear method does have some distinct advantages over the conventional methods of obtaining tool wear information and for investigating the mechanism of tool wear, it does not replace or supercede the conventional methods. However, combined use of the two methods can contribute much towards solving the practical problems associated with the cutting process and tool wear mechanisms. *D* *Cw Syb.132.2231*

Energy spectrum for holes in diamond-type crystals
K. Ya. Shtivel'man. *Sov Phys, Solid State* 1960 Vol 2 (4) pp 598-604 (Oct) (Original in Russian)

Reports a calculation of the energy spectrum of p-type germanium and silicon.

See also *Industr Diam Abstr* 1960 Vol 17 p A211 (Sep); A303 (Dec). *D* *Bdf Ukjz*

Pearlitic malleable iron — An engineering alloy of new significance
L. W. Collins jun. *Machinery, NY* 1960 Vol 67 (3) pp 141-146 (Nov)

Unlike most very hard metals, pearlite malleable iron in its unhardened state has a machinability rating equal to that of many of the free-cutting steels. However, hardening is said to produce parts which reach 50 Rockwell C or more. 5 illustr, 2 tables.
D *Bfcz Unp*

Niobium alloy readily welded
Anon. *Financial Times* 1960 (22,241) p 13 (Nov 16)

A new niobium based alloy, which also contains 32% tantalum, is said to be both readily welded and machined. *D* *Bfxz Cqg/Bfxz Unp*

Gemstone inclusions — made visible. Edelsteineinschlüsse sichtbar gemacht
H. Draeger. *Umschau* 1960 Vol 60 (11) pp 337-339 (June 1) (In German)

Inclusions are important in distinguishing between a natural and a synthetic stone, and modern microphotography can reveal these and particulars of the crystal structure. The methods used are discussed. 13 illustr.
A *Bb.2591:Vjb*Bbb.2591:Vjb*

Identifying precious stones (XX). Wir bestimmen Edelsteine (XX)
Anon. *Gold u Silber* 1960 Vol 13 (9) pp 21-22 (Sep) (In German)

Lists some of the stones that might be mistaken for diamond. 8 tables. *A* *Bb Ccb*

Properties of graphite. Pt II—Thermal and electronic properties
L. C. F. Blackman. *Research, Lond* 1960 Vol 13 (11) pp 441-448 (Nov)

The thermal and electronic properties of near-ideal and defective graphites are discussed in terms of the fundamental anisotropic crystal structure. 5 illustr, 40 ref. *D* *Bhb Ud/Bhb Uez*

Photographing the Raman spectra of crystal powders. Über die Aufnahme der Raman-Spektren von Kristallpulvern
H. Moster, D. Stieler. *Z angew Phys* 1960 Vol 12 (6) pp 280-288 (June) (In German)

11 illustr, 3 ref, 5 tables.
A *Bd Ukjz Vk*

Fatigue properties of some high-strength steels
Anon. *Tech News Bull, US Bur Stand* 1960 Vol 44 (10) pp 174-175 (Oct)

3 illustr, 2 ref, 1 table. *D* *Bfd Unq*

Casting variables affecting the machinability of grey iron
E. A. Loria. *Metallurgia* 1960 Vol 62 (371) pp 103-107 (Sep)

The machinability of cast iron is related to the microstructure, rather than to the usual criteria of hardness and strength. 5 illustr, 12 ref, 3 tables.
D *Bfca Unp*

Gold as hard as steel
Anon. *Metalworking Prod* 1960 Vol 104 (42) p 9 (Oct 19); *Diamond News* 1960 Vol 24 (1) p 17 (Oct)

Soviet metallurgists have perfected a new gold alloy as hard as steel and easily processed, according to the news agency *Tass*. The alloying constituents are listed as copper, manganese, zinc and cadmium. Hardness characteristics have not impaired natural lustre and the alloy will not oxidize, it is claimed. Applications are intended principally in the fields of electronics and switching devices. *D* *Bfxz*

Properties and applications of glass-ceramics
S. D. Stookey. *Engrs' Dig* 1960 Vol 21 (11) pp 85-86 (Nov); *Mech Engng, NY* 1960 Vol 82 (10) pp 65-68 (Oct)

Because of their dimensional stability, a potential application of glass-ceramics appears to be in precision instruments and machine tool components. Properties are described. 1 illustr, 1 table.
D *Blz U/Blz.1451*

Metal dislocation. Theory and applications. Les dislocations dans les métaux. Théorie et applications
A. Roos. *Métallurg constr mécan* 1960 Vol 92 (7) pp 517-528 (July) (In French)

9 illustr. *A* *Bf Unk*

DIAMOND, ETC, IN INSTRUMENTS

X-ray diffraction technique for small samples
R. K. Sorem. *Amer Min* 1960 Vol 45 (9/10) pp 1104-1108 (Sep-Oct)

Discusses preparation of powder mounts for work with the X-ray powder camera when small samples are used, explaining the technique of preparing a few particles, perhaps less 10 μ in size and scratched from mineral grain. An ideal way of obtaining the powdered sample is to scratch the mineral grain, whether in hand specimen or in a polished or thin section, with a sharp diamond point. Either a standard diamond 'pencil' or a mounted gramophone needle can be used; the former is cheaper and works well, provided that the point is not badly chipped by rough usage; but the stylus, when mounted in a pin vise, is more convenient when sampling is to be done while observing the specimen with a microscope. The stylus point is small and, in some models, the staff holding it can be bent so that little clearance is needed above the specimen. The stylus point is well machined and smooth so that chipping or bevelling is needed before it will bite into the sample surface properly; such bevelling can be done by careful touching with a fine grinding wheel. A figure illustrates such a stylus modification. 5 illustr, 2 ref.
D *Bc Cep Nc/Bcz Vw Wcfd/F Hlc Nv*

Differential gaging gives millionths accuracy without precision fixturing
Cleveland Instrument Co, 6220 E Schaaf Rd, Cleveland 31, Ohio. *Grinding & Finishing* 1960 Vol 6 (10) p 54 (Oct)

A new approach to high precision measurements uses simple electronic type gauging equipment and eliminates the need for expensive short-lived mechanical fixturing, it is claimed. The basic equipment required consists of two identical gauge heads and a differential input amplifier. 1 illustr. *D* *Vfd Wbbz*

The wire grid as a near-infrared polarizer

G. R. Bird, M. Parrish jun. *J Opt Soc Amer* 1960 Vol 50 (9) pp 886-891 (Sep)

Wire grids with microscopic elements are shown to be very useful infrared polarizers. The method of fabricating grids with periods as small as 463 mμ is described. Transmission gratings are used as forms and metal is deposited preferentially on some portions of the individual grooves. The groove shape of the original grating is controlled by setting the ruling diamond, and this shape is copied or blazed in the transparent replica. The detailed form of the finished metal deposit is in part determined by the shape of the grooves. 6 illustr, 16 ref.

L *Az Cegd Nf/Swd Tfd*

Instrument for the measurement of specular reflectivity of bright metal surfaces

B. A. Scott. *J sci Instrum* 1960 Vol 37 (11) pp 435-438 (Nov)

The measurements described here are confined to bright anodized aluminium, but it seems likely that the gloss head could also be used for assessing other surfaces, such as mechanical polishing on aluminium and other metals. 3 illustr, 3 ref, 4 tables.

D *Bfg Chm/Bf Ukg Vfd Wb*

Are spirit-levels good enough ? . . . . for machine tool alignment

Henri Hauser Ltd, Switzerland. *Metalworking Prod* 1960 Vol 104 (43) pp 87-89 (Oct 26)

While spirit levels have their uses, it is stated that the method should not be used for aligning and checking such machines as jig borers and jig grinders. Advantages and disadvantages are considered in the light of tests done on alignment of high precision machine tools. 4 illustr.

D *Pr Unf Vfd Wb*

Pneumatic gauging—the technique and its applications

I. G. Morgan. *Mach Shop Mag* 1960 Vol 21 (11) pp 662-671 (Nov)

12 illustr, 8 ref. *D* *Vfd Wbbz.1456*

The microscope in engineering

A. E. Bingham. *J Jr Instn Engrs* 1959 Vol 69 pp 359-382 (Aug); *Instrum Abstr* 1960 Vol 15 (11) p 634 (Nov)

D *Vwk Wcm*

Investigation concerned with the stability and accuracy of slip gauges

US National Bureau of Standards. *Machinery, Lond* 1960 Vol 97 (2503) pp 1025-1028 (Nov 2)

An interim report on a long-term research programme describes experiments in connection with stability of slip gauges. Various types of surface treatment were tested in an attempt to produce enhanced hardness and wear resistance. New measuring instruments include a high precision interferometer and a mechanical comparator which provides for 'dynamic' checking. Other aspects of testing are covered. 5 illustr, 3 tables.

D *Wbbz.1311*

Extremely stable gauge blocks for precision measurements

Anon. *Instrum Pract* 1960 Vol 14 (9) pp 978-979 (Sep)

In a long-range research programme aimed at an accuracy of 1 part in 10 million gauge block callibrations, the National Bureau of Standards has recently made significant advances with the development of highly stable blocks and ultra-precise measurement techniques. Production techniques and results achieved are described. 1 illustr, 3 ref, 1 table.

D *Qdd Tq.132*

Navy develops new ID gage

Naval Ordnance Lab. *Prod Engng* 1960 Vol 31 (45) p 9 (Oct 31)

A device for measuring the inner diameter of small holes can be used for any measurements, to the order of 0.2 in. id, within an accuracy of 0.0002 inch. 1 illustr.

D *Az Vfd Wbb*

Gage blocks for measuring millionths

G. B. Webber (Webber Gage Co). *Tool & Mfg Engr* 1960 Vol 45 (5) pp 83-85 (Nov)

Limitations of conventional gauge blocks may be overcome by using chromium carbide instead of steel as a block material. Both materials are discussed here. 3 illustr. *D* *Rgz Wbbz*Rw Wbbz*

Photo-cells measure better than human eye

Hilger & Watts Ltd; National Physical Laboratory. *Metalworking Prod* 1960 Vol 104 (42) pp 65-67 (Oct 19)

A photo-electric setting system, applied to the Microptic autocollimator and micrometer microscope, embodies a vibrating slit. Advantages claimed are quicker, more accurate setting than is possible by visual observation through the eyepiece; observations can be made from a convenient position, thus reducing operator fatigue and likelihood of error. Principles of construction and operation are explained. Many visual instruments may be adapted to photo-electric reading, but this must be done through the manufacturers. 8 illustr. *D* *Wcmz*

Length measurement using a dynamic technique

R. G. N. Hall, V. W. Stanley (National Physical Lab). *Machinery, Lond* 1960 Vol 97 (2502) pp 959-964 (Oct 26)

With the system described here, use is made of the inherent accuracy of subdivision of a time scale in calibrating a linear scale or determining displacements in a machine where a constant velocity can be provided: indicators, micrometers, or other means of measuring errors are not required. The principle is illustrated by the calibration of a diffraction grating mounted on a lathe used for producing very precise helices. 10 illustr, 7 ref.

D *Ceqb Pr Tfd:Qdd*

Gage checks concentricity of threaded and reamed holes

R. Isetts. *Machinery, NY* 1960 Vol 67 (3) p 131 (Nov)

An interesting gaging set-up was designed to check the concentricity between a threaded hole in an outside wall and a reamed hole in an inside wall. Since the hole being checked was partially hidden, one of the major considerations was that the gauge be read from the outside. The unit is illustrated. 1 illustr.

D *Az Qd Wb*

Handling the little ones

Micromanipulator Co. *Prod Engng* 1960 Vol 31 (41) p 9 (Oct 3)

Probe-tipped units to aid assembly and testing of tiny components, particularly semi-conductor devices, are available in right and left hand versions. 1 illustr.

D *Tq.1341:Tdb*

Optical measuring applied to machine tools

J. Heidenhain; British Rep: Alexander S. Newall Machine Tool Co Ltd, Finchley Rd, London NW 3. *Mach Shop Mag* 1960 Vol 21 (11) pp 700-702 (Nov)

A series of optical measuring units incorporates a transverse step vernier chart which is read in two co-ordinates. This type of unit is said to overcome disadvantages of devices using scales with direct measuring microscopes. 3 illustr.

D *Pr Vfd Wc*

The solid image microscope [:] An instrument giving information in depth by optical scanning

R. L. Gregory. *Research, Lond* 1960 Vol 13 (11) pp 422-427 (Nov)

A section is devoted to industrial and scientific applications. 2 illustr, 7 ref, 1 table.

D *Wcmz*

Hydraulic actuator increases plunge-grind output

Federal Products Corp, 1144 Eddy St, Providence 1, RI. *Grinding & Finishing* 1960 Vol 6 (10) pp 62-63 (Oct)

A new Federal-Arnold actuator is an hydraulically operated device for automatic positioning and retracting of a continuous grinding gauge. 1 illustr.

D *Chcd Pr Psc*

Mechanical surface-roughness comparator

Anon. *Metal Treatm* 1960 Vol 27 (180) p 388 (Sep)

Designed for workshop use, the Rubert surface-roughness comparator is based on measurement of the friction coefficient of machined surfaces and can be calibrated in CLA or in other standards with high enough accuracy. The instrument is said to represent a departure from conventional methods, and it can be considered as a mechanized finger-nail with a consistent and repeatable meter reading. Operation is described.

D *Wgf*

Ultrasonoscope probe manipulator

Ultrasonoscope Co (London) Ltd. *Instrum Pract* 1960 Vol 7 (107) p 1879 (Nov)

The crystal face of the inspection probe may be aligned with the axis of rotation after insertion in the manipulator. The probe may also be aligned with respect to the specimen under inspection by an adjustment which is independent of the scaled manipulator controls. 1 illustr.

D *Tdb Vwghb*

Micro measuring instrument

British rep: Robert G. Macfarlane. *Instrum Rev* 1960 Vol 7 (107) p 1893 (Nov)

The new Swiss-built Projectina micro-measuring instrument, which magnifies from 7 to 3,000 times, allows projection of specimens onto a ground glass screen with simultaneous examination through a built-in eyepiece. Two sets of optics give direct comparison of two specimens side by side on the same screen. Metallurgy and precision instrument manufacture are among the fields of application of the latter feature.

D *Bfa Cz Wcmz*

BP 831,614 (Aug 16, 1957) **H. Kortum, K. Papello, VEB Carl Zeiss Jena**

Micrometer dial gauges

Precision measuring of the expansion of crystals due to magnetic or electric forces or testing of minutely worked surfaces is made possible by excluding friction. As shown in Fig 1, two blades 1 and 1' are arranged with their end portions 3 and 3' attached to fixed parallel guides 5 and 6 and their other end portions 4 and 4' inter-connected. When the feeler organ 7 is being displaced, the end portions 3 and 3' roll practically without friction on the inner sides of the guides 6 and 5 and the end portions 4 and 4' roll on each other, displacing the glass-hair pointer 2 which is practically weightless, the displacement being indicated on an enlarged scale. The pointer may control a potentiometer for electric remote indication. (4 claims, 3 illustr).

J *Wbd.545*

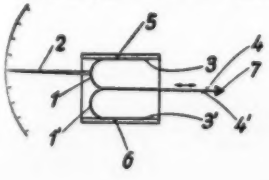


Fig 1. A diagram of the mechanism. BP 831,614.

DAS 1,077,441 (Apr 3 ,1959) **P. -F. Warning, Sennheiser Electronic F. Sennheiser**

Stylus for a precision tracer or a surface tester. Taststift für Feintaster oder Oberflächenprüfgerät

(6 claims, 3 illustr). *D* *Tdc Wgf.545*

HARDNESS AND WEAR TESTING

Effect of geometrical parameters of conical diamond tips on the results of metal hardness measurement

B. I. Pilipchuk. *Zav lab* 1960 Vol 26 (4) pp 510-513; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1907 (Sep) (Original in Russian)

D *Bf Cvd Ndg*

Portable diamond-cone hardness tester for use with large components of machines

L. M. Feigin. *Zav lab* 1960 (2) pp 233-235; *Instrum Abstr* 1960 Vol 15 (10) p 574 (Oct) (Original in Russian)

D *Ndg Wghc*

The production of the SIMCA Aronde

P. A. Sidders. *Machinery, Lond* 1960 Vol 97 (2507) pp 1220-1229 (Nov 30)

Rear axle half shafts are induction hardened and are then automatically checked for hardness at five positions along their length. A Reicherter Briro-Automat automatic Rockwell hardness tester is used. 13 illustr. *D* *Az Cvd Wghc*

Relation between microhardness and microheterogeneity of glass

T. N. Keshishyan, M. B. Epel'baum. *Steklo i Keram* 1959 Vol 16 (8) pp 9-12; *Ceram Abstr* 1960 Vol 43 (10) p 229 (Oct) (Original in Russian)

Two series of glasses were studied: (*i*) those with different chemical composition but with the same thermal history; and (*ii*) those with the same composition but different thermal history. There is no clear relation between micro-hardness and composition, but a curve relating micro-hardness and the maximum linear crystal growth rate does show a relation. The degree of micro-hardness of glass and its crystallization capacity may be varied by changing not only the composition, but also the thermal treatment it receives, it is stated. *D* *Bm U/Bm Unhd*

Improved method of lubricant feeding in abrasion wear testing

IU. D. Pashin. *Zav lab* 1960 Vol 26 (3) pp 377-378; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1841 (Sep) (Original in Russian)

E *Cw Qr.1456*

Radioisotope study of tool wear

M. Paliobagis, E. J. Krabacher. *Tool & Mfg Engr* 1960 Vol 45 (5) pp 225-226 (Nov)

Paper presented at Summer Meeting of the Society of Automotive Engineers, Inc No SAE 181A.

D *A Cw Syb*

Low-temperature tensile-hardness correlations for SAE 4340 steel

J. Nunes, F. R. Larson. *Bull Amer Soc Test Mat* 1960 (249) pp 25-29 (Oct)

Vickers hardness and tensile strength were studied on one heat of SAE 4340 steel as a function of testing temperature. Tempered martensite, banite, and pearlite of various strength levels were tested at a temperature range of room temperature to 196° centigrade. It was found that these two variables are linear with respect to the reciprocal absolute temperature. Furthermore, the various strength levels formed a family of parallel lines. From this, it is possible to derive some simple empirical equations for calculating approximate values of Vickers hardness or tensile strength in the temperature range studied. Further, it was established that, for SAE 4340 steel, the SAE hardness-tensile-strength correlation for room temperature is reasonably valid in the range of temperature studied. 4 illustr, 7 ref, 8 tables.

D *Bfd Cvd Nde*

Study of the influence of some factors on the micro-hardness of single crystals of KCl and NaCl

Yu. S. Boyarskaya, Yu. P. Keloglu, M. K. Bologa, S. M. Dunaeva. *Sov Phys, Crystallogr* 1960 Vol 5 (1) pp 88-95 (July-Aug) (Original in Russian)

All micro-hardness measurements on potassium chloride crystals were with the PMT-3 instrument using its standard pyramid for indentation and scratching. Measurements were made on the (100) face of the crystal in two series of experiments, in each of which identical tests were done on three specimens. Experimental procedure is explained and tables and illustrations clarify results. An investigation was also made of the micro-hardness of sodium chloride crystals, subjected to repeated colouring and bleaching. The PMT-3 instrument was used again. A table shows the values of the micro-hardness in kg/mm² obtained as a result of the measurements. Conclusions are summarized. 6 illustr, 10 ref, 4 tables.

D *Bz Cvdb Wghd*

The effect of cold work on the fatigue properties of two steels

N. E. Frost (National Engng Lab). *Metallurgia* 1960 Vol 62 (371) pp 85-90 (Sep)

Vickers diamond pyramid hardness tests were carried out on the ends of the fatigue specimens. Tables show average Vickers hardness numbers of mild steel and nickel-chromium steel specimens. The mild steel results show that hardness values increase with prior cold work, attaining a maximum value of about 230-240 Vickers hardness at about the same strain value as that at which the maximum fatigue limit occurs. However, further cold work does not alter the hardness value appreciably. It is concluded that hardness values give no definite indications of when the maximum amount of prior cold work for maximum fatigue strength is exceeded. Other conclusions are recorded. 14 illustr, 5 ref, 6 tables. *D* *Bfd Cvd Nde*

Motorized hardness tester reduces sheet metal inspection costs

Wilson Mechanical Instrument Div, American Chain & Cable Co Inc, Bridgeport 2, Conn. *Mod Mach Shop* 1960 Vol 33 (5) p 176 (Oct)

At Ingersoll Steel Div, Borg-Warner Corp, the new semi-automatic Rockwell Model IYR allows testing of sheet metal without the necessity of cutting samples. The operator slides the edges of steel sheets under the test anvil, the penetrator is depressed, and hardness values are automatically indicated on the dial gauge. 1 illustr. *D* *Bfz Cvd Psj Wghc*

Determining hardness by X-rays

R. E. Marburger, D. P. Koistinen. *Metal Progr* 1960 Vol 78 (4) pp 218-222 (Oct)

Abstract of paper 'The determination of hardness in steels from the breadth of X-ray diffraction lines', ASM preprint No 228, 1960.

Describes an X-ray non-destructive method of measuring the surface hardness of martensitic steels. The method is based on the experimental observation that the breadth of a martensite X-ray diffraction line from the surface increases with increasing hardness. Since the X-ray data needed are those used in determining residual stresses, the two measurements can be made simultaneously. *D* *Bfd Cv Swm*

Atoms aid machining research

Anon. *Iron Age* 1960 Vol 186 (1) p 83 (July 14)

Radio-isotopes are used for tool wear tests. 1 illustr.

L *A Cw Syb*

The corrosion resistance of cast nickel-molybdenum-iron alloys

G. N. Flint. *Metallurgia* 1960 Vol 62 (373) pp 195-200 (Nov)

Influence of heat treatment on hardness is among subjects covered, and tables show diamond pyramid hardness under various conditions. 14 illustr, 6 ref, 3 tables. *D* *Bfxpz Ck Unhcc*

TRUING OF GRINDING WHEELS

Fillet-rolling diesel-engine crankshafts

W. Egger (Foote-Burt Co). *Machinery, NY* 1960 Vol 67 (3) pp 127-130 (Nov)

To ensure uniform roller contact over the entire fillet surface, the preparatory grinding of the fillet must have a near-perfect circular section. Although circularity in the fillet can be held by profile truing the grinding wheel radius to ±0.0025 in., an automatic truing operation is planned which will keep a radius of 0.120 in., ±0.001 inch. 4 illustr.

D *Agn Chc Pe:Cgf Psfc*

Rod crushes form on grinding wheel

H. J. Gerber. *Metalworking Prod* 1960 Vol 104 (42) p 89 (Oct 19)

Many simple forms, such as concave radii, can be crushed into grinding wheels without the use of specialized equipment. The illustration shows a set-up where a radius is being formed in the periphery of a wheel, using a length of silver steel rod secured to the magnetic chuck as a crusher. Other forms, said to be difficult to produce with a truer, can also be shaped in the same way, it is claimed. The crushing procedure is described. 1 illustr. *D* *Ab Cl*

Maximum precision at minimum cost

C. Christen (Foote-Burt Co). *Tooling & Prod* 1960 Vol 26 (8) pp 70, 72, 74, 76, 78 (Nov)

Techniques which cut grinding costs are among topics discussed, *eg* the use of a precision grinder only for precision grinding. Diamond form truing is preferred to crush roll methods, since only one or two parts in each die have the same form and a precision forming roll would be an unjustified expense. Die segments receive a final polish by hand lapping. 4 illustr.

D *Chcw.252/Cgh Nj*

The Hanover Machine Tool Exhibition — 2 [:] An automatic flute grinder

Anton Kirner ; British rep : John Kimbell Machine Tools Ltd, 4 South Lambeth Place, London SW 8. *Machinery, Lond* 1960 Vol 97 (2503) pp 1006-1007 (Nov 2)

A Kirner machine for grinding flutes in tungsten carbide burrs is fully automatic and grinds spiral flutes in one cycle. A diamond impregnated wheel is used and grinding procedure is explained. Dressing of a V-shaped form on the diamond wheel is done by a silicon carbide wheel mounted on a horizontal spindle unit. The entire grinding head is swivelled horizontally and the diamond wheel is run in contact with the silicon carbide wheel for dressing one flank of the form. The spindle unit for the dressing wheel is then swivelled to a pre-set second position and both wheels are run in contact again for dressing the other flank of the form. Specifications are given. 2 illustr.

D *Bkcb Chcz Nv Prs:Cgh Psf.27*

Device for diamond dressing of wheels while maintaining the distance between the wheel and the axis of the workpiece. Dispositif à diamanter les meules conversant la distance entre la meule et l'axe de la pièce à travailler

C. Bossmann. *Mach Mod* 1960 Vol 54 (617) p 52 (Aug) (In French)

This dressing device, for use on cylindrical grinding machines, gives automatic compensation for wheel dressing and was designed for mass-production grinding ; it is said to minimize the testing necessary on the diameter. The sequence of dressing operation is described. 1 illustr.

A *Chcl Pr:Njb Psf*

Constant-force springs . . . controlled force for production

H. E. Mankonen. *Tool & Mfg Engr* 1960 Vol 45 (5) pp 117-120 (Nov)

One manufacturing application of the constant force extension spring is in exerting constant ratio cam pressure in a manual contour wheel dresser. The counteracting zero gradient counter-force springs produce a constant pressure at the feed cam surface at all positions of the template and diamond slides. Principles of operation are explained. 6 illustr.

D *Cg Nj Psf.1456*

Automatic dresser reduces tool costs through positive sharpening control

Barber-Colman Co, Machine Tool Div, Rockford, Ill. *Mod Mach Shop* 1960 Vol 33 (5) pp 295-296 (Oct)

An automatic, hydraulically actuated diamond dresser which operates continuously as the wheel sharpens is said to reduce tool costs through improved control of sharpening operations on the No 6-5 Hob Sharpening Machine. Speed, accuracy, finish, wheel wear, and diamond life are controlled automatically and continuously while sharpening hobs, *etc*, and the machine need never be stopped for wheel dressing. The wheel feeds into the diamond a pre-determined amount before each dressing cycle, and infinitely variable dresser arm speed permits any desired combination of sharpening speed and finish, it is claimed. 1 illustr.

D *Ab Cg Nj Psfb*

Single-purpose circular grinder AFC 630A. Einzweck-Rundschleifmaschine AFC 630A

Fortuna-Werke, Stuttgart-Bad Cannstatt. *Maschinenwelt u Elektrotechnik* 1960 Vol 15 (11) p 475 (Nov) (In German)

The form truing of a 600 mm diameter grinding wheel, is done by the ' Finiform ' device ; the process is initiated through the meter and controlled according to the cycle set. 1 illustr. *A* *Chc Pr Psf*

Some advice and reflexions on the use of grinding wheels and of diamonds. Quelques conseils et réflexions sur l'emploi des meules et l'utilisation des diamants

Anon. *L'Usine Belge* 1960 Vol 37 (1684) p 12 (May) (In French)

General advice is given on the maintenance of milling machines and diamond tools. A diamond should be set at an inclination of 2° to 5° towards the base, and 5° to 8° to the right ; it should be turned a quarter-turn every day to ensure that a sharp point is always maintained. The need for care is stressed.

A *N.138*

USP 2,926,654 (Apr 3, 1958) **H. C. Johnston**

Grinding wheel dresser

(4 claims, 5 illustr). *D* *Psf.545*

USP 2,929,172 (July 16, 1956) **J. H. Pasell, Van Norman Ind Inc**

Machine for cutting a succession of workpieces to a predetermined size

The main problem to be solved is compensation for the changes of position of the cutting tool caused by wear. In a grinding wheel, truing alters size and position of the cutting face. A compensating mechanism

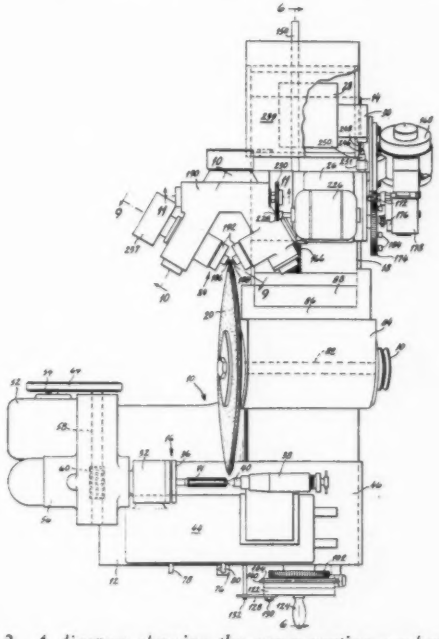


Fig 2. A diagram showing the compensating mechanism 28 which normally moves in unison with the grinding wheel support 18. USP 2,929,172.

28 in Fig 2 normally moves in unison with the grinding wheel support 18 but is adjustable transversely relatively to the support. When the truing device 24 is adjusted towards the wheel 20 with a resultant reduction in wheel radius, simultaneously the compensation member is automatically adjusted rearwardly to an extent equal to the adjustment of the truing device. (25 claims, 13 illustr). Ref cited : 3 USP.

J *Chcz Pr Psf.545*

USP 2,930,371 (Oct 2, 1957) **E. V. Flanders, Jones & Lamson Machine Co**

Grinding wheel dressing device

Single point cam-controlled truing devices are subject to failure through damage to the diamond point. The single point tool is therefore replaced by a rotary

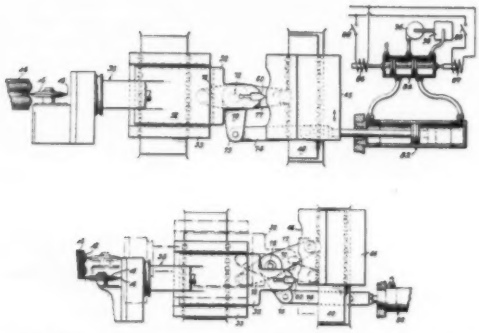


Fig 3 (top) and 4 (bottom). Two positions of the device. USP 2,930,371.

truing disk of the sintered diamond particle type. It is, however, not an ordinary truing roller moving across or into the periphery of the wheel in a straight line, but is a disk with a pointed periphery or its equivalent and is moved in accordance with a predetermined contour, generating a corresponding contour in the grinding wheel. The disk may be of the type made by Koebel Diamond Tool Company. Fig 3 and 4 show two positions of the device in a schematic plan. Disk 15 with pointed periphery 16 trues wheel 14 with periphery 12 according to the movement of stylus 60 along the enlarged contour of template 46, the movement being translated by a lever mechanism 70 hydraulically operated under electrical control of solenoids 86, 87. (10 claims, 4 illustr). Ref cited : 3 USP.

J Ab Cgh Nje.545

USP 2,930,372 (Nov 25, 1957) **N. Hoglund**

Contour forming apparatus

The apparatus is to be attached by its base to a grinding machine. The base has an inner slide connected to an hydraulic piston. This slide carries a cam follower. The housing carrying the truing tool is slidable on the base parallel to the axis of the wheel to be trued. Within this housing are the various slides for controlling the movement of the housing and of the truing tool. The follower in the inner slide of the base contacts a feed cam on the main slide in the housing so that, on movement of the inner slide of the base, the whole housing can be moved. A tool-carrying slide mechanism is mounted at one end of the housing. The tool slide can be moved radially of the wheel without movement of the housing and its other slides. The tool slide mechanism operates with two slides, one carrying the truing tool and the other coupled to the tool slide by a feed screw arrangement, which includes a pawl and ratchet mechanism for a step-by-step infeed of the truing tool for each pass across the grinding wheel. The other slides within the housing are the main slide carrying the feed and contour cams and the contour slide supporting followers connecting the contour cam and a ratio cam on one of the tool slides. Movement of the contour slide controls a pair of slides with the truing tool. (14 claims, 9 illustr). Ref cited : 1 USP.

J Nj Psf:Chc Pr.545

USP 2,930,373 (Feb 26, 1959) **W. F. Jessup, R. H. Weissgerber, Cincinnati Milling Machine Co**

Grinding machine truing mechanism

The mechanism is designed to form arcuate surfaces on wheels without the cutting diamond needing a fixed centre, or a specially shaped cam being necessary which then can only be used for a single arcuate conformation. The contouring movement towards and away from the wheel while traversing the surface is caused by a pivotal follower bar engaging fixed cam surfaces which may be straight bars. Fig 6 and 7 are diagrams showing the developments of the contours on a grinding wheel and a control wheel of a centreless grinder by a mechanism as seen in cross-section in Fig 5. Slide 132 in Fig 5 and 6 is reciprocated, by a motor,

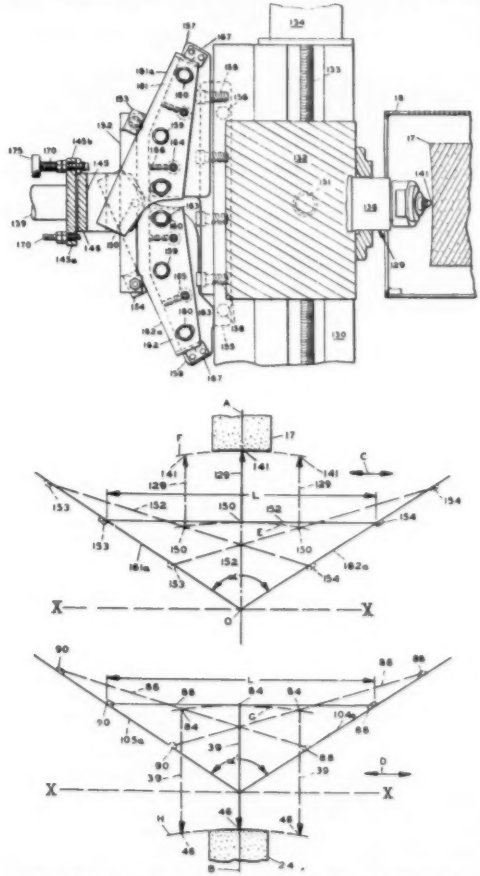


Fig 5 (above), 6 and 7 (below). USP 2,930,373.

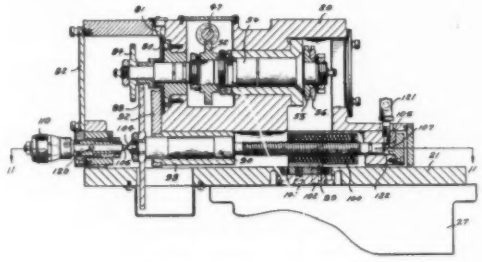
as indicated by arrows C. Fig 6 shows the contouring movement imparted to member 139 carrying diamond 141 by follower bar 152 connected at pivot point 150. The ends of the bar are engaged with the cam surface 161a and 162a of guides 161 and 162. Pivot point 150 describes an elliptical arc E equal to arc F described by the diamond point. A similar movement is produced for the truing of the control wheel shown in Fig 7. (9 claims, 14 illustr). Ref cited : 1 USP.

J Ab Cgf Psf:Chc Pr.545

Swiss P 344,636 **R. A. Mahlmeister, Cimatool Corp** (Feb 4, 1954—conv date, USA)

Method and device for machining the profiles of a multiplicity of profiled workpieces in one operational cycle. Verfahren und Einrichtung für das Aufarbeiten von einer Vielzahl von Profilen aufweisende Koerpern in einem Arbeitsgang

The specification refers in particular to thread grinding wheels with several peripheral ribs which are trued by a tool reciprocating in the direction of the axis of the wheel so that, when moving in one direction, one group of profile portions is trued and, when moving in the other direction, the other group of profile portions is trued. As synchronism of all movements is essential, the main problem is compensation for losses when reversing the transverse movement and for the motion lost in the gearing. The problem has been solved by incorporating an adjustment device for adding a predetermined play to the loss of motion inherent in the



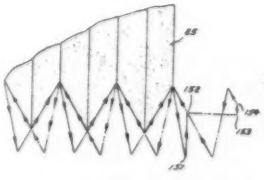


Fig 8 (above) and 9 (left). Swiss P 344,636.

gearing. The adjustment device is shown in cross section in Fig 8 at 110 operating with contacts 106 and 107 for the ends of lead spindle 90. 54 is a cam shaft with cams 55 and 56 for the feed of the tool towards and away from the wheel. Fig 9 shows the path of the diamond point in both directions and the movement 151, 152-153, 154, while reversing. (6 claims, 17 illustr).

J *Ab Cg Nj:Chc Pr.545*

PRECISION MACHINING OF METALS

Diamond tools turn microfinishes

Anon. *Iron Age* 1960 Vol 186 (5) p 117 (Aug 4)

A standard lathe using diamond cutting tools will produce a 6 micro-in. finish on turned parts. Single point diamond tools have been used for turning metal rolls to the perfect finishes required for roto-gravure printing. Cost of preparing the metal rolls is said to be reduced by the use of shaped diamond tools. A face cut is first taken on the rolls with a carbide lathe tool leaving marks from 0.001 to 0.005 in. deep on the cylinder surface. The diamond tool is used next, and having a depth of cut of 0.005 in., it clears the surface of the carbide tool marks. Coolants are unnecessary, and, after four years, the three original diamond tools are still in use and show only a small amount of wear. 1 illustr. *L* *Ag Bf Ceqb Nf Pr*

Machine tools 1960

R. H. Eshelman. *Iron Age* 1960 Vol 186 (6) pp 193-205 (Aug 11)

Sections deal with advances in drilling, boring, turning, grinding, honing, broaching, *etc*, and deal with various features of machines for these operations which were seen at the Chicago Machine Tool Exposition, Sep 1960. 13 illustr. *L* *Ceq.132/Pr.27*

How to machine molybdenum

Anon. *Metalworking Prod* 1960 Vol 104 (43) pp 73-78 (Oct 26)

Altering the grain structure is the only way to influence significantly the machinability of molybdenum, which has a hardness of 200 to 250 Brinell but is much more abrasive than steel of the same hardness. Choice between HSS and carbide tools depends largely on production quantities. Factors to be considered in various conventional machining operations are considered, and chemical milling, electro-polishing, photo-etching and electro-erosion machining are also covered. 10 illustr. *D* *Bfq Ceq*

Drilling super-strength alloys

C. J. Oxford jun. *Carbide Engng* 1960 Vol 12 (9) pp 12-16 (Sep)

Gives fundamentals of set-up and drill design. 6 illustr. *D* *Bfx Cfb*

Information on the design and working of new milling machines with either semi- or fully-automatic work cycles. Informations sur la conception et le fonctionnement de nouvelles machines à fraiser à cycles de travail semi ou entièrement automatiques

Anon. *L'Usine Belge* 1960 Vol 37 (1697) pp 8-9 (Aug) (In French)

A *Cff Prs*

The evaluation of cutting tools

J. Taylor. *Machinery, Lond* 1960 Vol 97 (2503) pp 996-1000 (Nov 2)

Attention is drawn to the need for closely controlled conditions if cutting tools are to be evaluated accurately. The various requirements for a valid experiment are outlined, and the procedure of a typical routine is explained. A test for evaluating resistance to interrupted cutting is explained.

D *Pd Uqe.21*

Metallurgy in nuclear power technology [:] 5. Fuel element canning materials — Pt I

J. C. Wright. *Metal Treatm* 1960 Vol 27 (182) pp 449-454 (Nov)

Correct machining technique is mentioned. Tungsten carbide tools are generally used and the importance of avoiding the production of fine swarf is stressed. 4 illustr, 1 table. *D* *Bf Ceq Pdc.1456*

Practical application of theory to machining of stainless steels

G. J. Stevens (Armco Steel Corp). *Mach Shop Mag* 1960 Vol 21 (11) pp 703-706 (Nov)

7 illustr, 1 table. *D* *Bfdb Ceq*

Cutting steels in the light of the latest developments. Schnittstähle under Berücksichtigung der neuesten Entwicklung

W. Haufe. *TZ f prakt Metallbearb* 1960 Vol 54 (10) pp 501-504 (Oct) (In German)

11 illustr, 9 ref, 3 tables.

A *Bfd Ceg.132*

Self-contained pneumatic chucks for turret lathes

V. A. Volosatov. *Vestnik mashinostroeniya* 1958 (6) pp 64-67; *LLU Transl Bull* 1960 Vol 2 (11) pp 985-991 (Nov) (Original in Russian)

4 illustr. *D* *Ceqb Pr Psh*

New universal tracer system shown in use on new lathe

Monarch Machine Tool Co, Sidney, Ohio. *Mach Tool Blue Bk* 1960 Vol 55 (10) pp 274-275 (Oct)

The Monarch Electro-Gage Tracer, a new 360°, two-axis electro-hydraulic system, has no contour limitation except any that might be created by the cutting tool. Recommended for machining workpieces with complex contours, the system can only be applied on new lathes at the factory. 1 illustr. *D* *Ceqbz Pr*

Miniature drill converts machines to small hole drilling

Milburn Machine Works, 203 Milburn Ave, Baldwin, LI, NY. *Mach Tool Blue Bk* 1960 Vol 55 (10) p 277 (Oct); *Iron Age* 1960 Vol 186 (7) p 118 (Aug 18)

The Turbo-Drill, driven by a high speed air turbine, can be mounted in any standard drill press, lathe, *etc*, and permits accurate drilling of holes from 0.032 in. to 0.001 in. diameter. A pneumatic down-feed is said to eliminate the need for specialized operator skill. 1 illustr. *D* *Cfbd Pl*

Double-carbide saw blades

L. S. Starrett Co, Athol, Mass. *Machinery, NY* 1960 Vol 67 (3) p 202 (Nov)

The Alloy Band, a double-carbide band saw blade, is said to cut 50% faster than carbon bands and to have improved hot hardness and abrasion resistance. Many of the tougher alloy steels can be cut. 1 illustr.

D *Pcz Rg Uqc*

Microflex tool-holder

Hardinge Bros Inc, Elmira, NY. *Machinery, NY* 1960 Vol 67 (3) p 218-220 (Nov)

A Microflex tool holder for positive adjustment of finer finish cuts to fifty millionths of an inch has been developed for use on chucking machines. It can also be used on jig borers, screw machines, and milling machines for holding boring tools.

D *Ceg Pr Psp*

Try carbide grips for new savings

Anon. *Carbide Engng* 1960 Vol 12 (9) pp 20-21, 29 (Oct)

It is claimed that use of tungsten carbide gripping inserts can make holding devices more efficient in many cases and thus lead to savings. Application in some machining jobs are described. 4 illustr.

D *Pdcb*

Pot broaches for Chrysler transmission parts

J R. Cypher (Chrysler Corp). *Amer Mach* 1960 Vol 104 (22) pp 100-103 (Oct 31)

Describes a technique in which a heavy steel sheet is fitted with a number of broaching tools that cut on the periphery of the part. A single stroke at a pot broach can complete a large number of irregular surfaces such as gear teeth and can complete tolerances as close as 0.0005 in., it is claimed. 11 illustr.

D *Cfm Pr*

Steam turbine-bucket increases numerical profiling efficiency

L. W. Collins jun. *Machinery, NY* 1960 Vol 67 (3) pp 112-117 (Nov)

Describes tape-controlled milling of turbine buckets on Ex-Cell-O Numera-Trol machines. 10 illustr.

D *Az Cff Pr Wpb*

Hydraulic spindle drives

B. Welte. *Tool & Mfg Engr* 1960 Vol 45 (5) p 223 (Nov)

Digest of paper given at 4th Production Machine Tool Hydraulic Conference, Detroit, Mich.

Greater accuracy and higher horse-power are needed to allow use of carbide tools and to machine various high temperature alloys. Low friction and inertia and low weignt of moving components are also desirable. Hydraulic drive spindles are said to help meet these demands in several ways described here.

D *Bfxz Ceq Pdc Pr Pslz*

Elimination of vibration in vertical boring and turning machines with long tool travels

V. I. Kopitzyn. *Vestn Mash* 1960 (6) pp 36-37 (June); *Engrs' Dig* 1960 Vol 21 (11) p 127 (Nov) (Original in Russian)

D *Ceqb Pr Qn/Cfd Pr Qn*

Modern deep boring tools. Neuzeitliche Tiefbohrwerkzeuge

Gebr Heller, Bremen-Mahndorf. *TZ f prakt Metallbearb* 1960 Vol 54 (9) p 465 (Sep) (In German)

A *Cfd Plk*

Precise drilling of 5566 holes, 0.0354 in. diameter

Henri Hauser Ltd; British Rep: Wickman Ltd, Coventry. *Mach Shop Mag* 1960 Vol 21 (11) pp 677-678 (Nov); *Metalworking Prod* 1960 Vol 17 (46) pp 69-70 (Nov 16)

Describes use of a Hauser Type 5 jig borer in drilling of rotary perforating tools. The two tools are a pair of 14¼ in. diameter rollers, one constituting the die and the other carrying the punches. Drilling technique is explained. 3 illustr. *D* *Cfbp Plz*

Thread cutting

Newage Machine Tools Ltd, 98-100 Croydon Rd, London SE 20. *Mech World* 1960 Vol 140 (3496) p 477 (Nov)

The Fransson and Brantemo range of thread cutting machines comprises three different models for bench or pedestal mounting all of which have hollow spindles permitting unlimited length of thread cutting. A pipe cutter which cuts pipes to any desired length after thread cutting is standard: this is claimed to be an exclusive feature. A special fixture is available for facilitating the grinding of chasers in their own holders on an ordinary surface grinder. 1 illustr.

D *Ceqbd Pr*

The production of the Simca Aronde

P. A. Sidders. *Machinery, Lond* 1960 Vol 97 (2505) pp 1104-1115 (Nov 16)

Describes machining operations on the differential housing. Shot-blasted castings are finish turned by one operator on two Ex-Cell-O machines. Other interesting stages of production include use of two special Burr machines for roughing and finishing the spherical seatings in the planet pinion bores; cutters are changed automatically. 14 illustr.

D *Am Ceqb Pr/Chm Pr*

Automatic milling machine produces up to 6000 parts per hour

Baird Machine Co, Stratford, Conn. *Mach Tool Blue Bk* 1960 Vol 55 (9) p 214 (Sep)

The Baird Automatic Mill is reported capable of maintaining tolerances of ±0.0001 in. in the milling of precision electronic components as small as 0.05 by ¼ in., as well as tool bits as large as 1 in. square. Production is claimed as up to 6,000 parts/hour. 1 illustr. D *Az Cff Prs*

Turret lathe contours under tape control

Gisholt Machine Co. *Metalworking Prod* 1960 Vol 104 (42) pp 74-76 (Oct 19)

Describes the model 101 Factrol turret lathe equipped with continuous path control for contouring, an operation previously considered to be done best by programming operation of a copying device working from the template within the cycle. 5 illustr.

D *Ceqb Pr Wp*

Wiedemann fine-boring machines for operations on connecting rods

Elgar Machine Tool Co Ltd, 172-178 Victoria Rd, London W 3. *Machinery, Lond* 1960 Vol 97 (2503) pp 1028-1029 (Nov 2)

3 illustr. *D* *Az Cfdb Pr*

'Ceroc' ceramic tools for threading. Outils céramiques 'Ceroc' utilisés en filetage

Compagnie générale d'Electro-Céramique. *Mach Mod* 1960 Vol 54 (619) p 91 (Oct) (In French)

A *Ceqhd Pdd*

Portable coolant system

Cutanite Corp, 1228 Utica Ave, Brooklyn 3, NY. *Tooling & Prod* 1960 Vol 26 (7) p 106 (Oct)

A wide variety of the new 'Custamist' fine fog coolant systems are available for use in all machining operations. There is no pressure in the tank and work visibility is increased because splash guards are unnecessary, it is stated. 1 illustr. *D* *Sj*

Both ends in one auto cycle

George Kingsbury & Co (Machine Tools) Ltd, London SW 1. *Metalworking Prod* 1960 Vol 104 (43) pp 90-91 (Oct 26)

Both ends of a component are machined in the same cycle on an Index B60F single spindle automatic. This is made possible by an air-operated work-reversing attachment mounted on the front cross-slide. Operation is described. 3 illustr. *D* *Ceq Prs Psc*

Die release solves threading problem

US Automatic Co, Amherst, Ohio. *Tooling & Prod* 1960 Vol 26 (8) p 64 (Nov)

A difficult threading problem led to development of a special electrically operated die release used on a Warner & Swasey 2AC chucking automatic which produces air cylinder heads requiring accuracy, concentricity, and good finish. 2 illustr.

D *Ax Ceq Pr Psc*

Tools at work

Giddings & Lewis Machine Tool Co. *Tool & Mfg Engr* 1960 Vol 45 (5) p 116 (Nov)

Inspection of a contoured part is done on a horizontal boring, drilling, and milling machine. The workpiece is first machined on a Numeripath-controlled machine for inspection. Efficiency of inspection is markedly superior to methods previously used and floor-space savings are gained by using the same machine for checking as well as machining, it is stated. 1 illustr.

D *Az Ceq Pr Wpb/Az Qd*

DIAMOND TECHNOLOGY

First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 55s 0d, post free.

CUTTING AND MACHINING OF STONE, GLASS, ETC.

Metalworking in miniature . . . to make semiconductors by the thousand

D. Fishlock. *Metalworking Prod* 1960 Vol 104 (44) pp 71-76 (Nov 2)

Describes production of silicon devices at Texas Industries Ltd, Bedford. Ductility of super-purity silicon is effectively nil and the material is nearly glass-hard so that difficult cutting problems arise. Ingots must be sliced into thin wafers and then chopped up into tiny disks and squares as semi-conductor parts. Typical wafer thicknesses are 0.011 and 0.015 in. with tolerances held to ±0.0001 inch. Two semi-automatic Felma machines slit four ingots at once with two or more diamond impregnated sintered steel disks, 0.015 in. thick and 5 in. diameter, run at 4,000 rev/min on a common shaft. The ingots are mounted in pivoted clamps on each side of the disks and swing into them simultaneously at a feed rate of 0.5 in./minute. Cutting sequence is described. Another slicing set-up is the Micro-Matic precision wafering machine using a 0.012 in. thick diamond impregnated wheel, 4 in. diameter, and run at 6,500 rev/minute. Feed rate is 3 in./min. and only one ingot is sliced at a time. A photograph shows the wheel in action. Lapping and etching sizing methods used are described. Ultrasonic machining cuts the fragments into disks and abrasive sawing produces the squares. A Felma unit, employing a copper disk with the periphery loaded with diamond dust, in an adapted watchmaker's machine used for sawing the squares. These 0.012 in. thick disks held in radial slots are said to be far cheaper than their sintered counterparts used in slicing, but depth of cut is limited to 1/16 inch. 12 illustr.

D *Bhc Ceg Nv Pr/Tn.13*

Optical glass from Jena. Optisches Glas aus Jena

Anon. *Feinmechanik u Optik* 1960 Vol 77 (8) pp 237-243 (Aug) (In German)

Among other topics, the article considers the grinding and polishing of glass, pointing out that since the abrasive material must be harder than glass diamond is frequently used. A paste of the powder and water is placed on the grinding wheel which revolves against the glass but in the opposite direction. 18 illustr.

A *Bm Chc Kmg/Bm Chm Kmg*

Fabricating glass with diamond

Anon. *Diamond Data* 1960 Vol 1 (5/6) pp 2-4 (June-July)

Cutting, grinding, and finishing of glass are among the oldest uses of diamond grit, which has established itself as an effective and economical material in many such applications. Increasing use of glass in industry has caused a corresponding growth in the range of uses of diamond grit and the trend promises to accelerate. This article surveys the current situation as reported in technical literature. The characteristics which make diamond particularly suitable for working glass are summarized and cutting with diamond wheels and saws, drilling with diamond grit, grinding, bevelling, and pencil edging operations are covered. A table shows savings made as a result of changing from non-diamond to diamond abrasive in a glass bevelling job. 1 table, 3 ref.

D *Bm Ceq Kl.21*

Grinding and polishing of plastics and lacquers. Schleifen und Polieren der Kunststoffe und Lacke

W. Burkart. *Industr Anzeig* 1960 Vol 82 (78) pp 1316-1317 (Sep 27) (In German)

6 illustr. *A* *Bp Chc/Bp Chm*

Working reinforced plastics with diamond

Anon. *Diamond Data* 1960 Vol 1 (7/8) p 4 (Aug-Sep)

Diamond is proving to be the most suitable abrasive for sawing and grinding reinforced plastics, particularly those made of laminates of plastics and glass fibre. An example is the cutting of melamine-glass laminates, which had caused rapid wear of conventional tools, resulting not only in high costs, but such changes in cutting wheel shape that specified dimensions could not be maintained. Metal bonded diamond wheels proved economic. The wheels were usually copper, because of its heat conduction, and were used wet or dry at speeds up to 6,500 surface ft/minute. Other examples include the successful use of diamond coated tools and cut-off wheels in working glass-reinforced plastics, as well as glass ceramic and other extremely abrasive types of material.

See also *Industr Diam Abstr* 1959 Vol 16 p A112 (June).

D *Bl Ceg Nw/Bpz Cej Nv Urc/Bpz Chc Nv Urc*

How goes your prescription toric surfacing ?

M. H. Hawkins (Autoflow Engng Ltd). *Mfg Opt* 1960 Vol 13 (12) pp 16-18 (Oct)

An assessment of some of the recent toric smoothing and polishing machines and methods. The first problem is that of roughing the toric lens surface and this usually implies diamond generation. It is stressed that increasing emphasis is now placed on accuracy at the roughing stage, and advice is given on maintenance and correct use of diamond wheels. Given stated conditions, a surface can be produced which needs only one smoothing operation before polishing. The question of the ratio of the smoothing spindles and polishing spindles required is considered. Points to be observed when choosing consumable materials in toric prescription lens production are listed as a guide, but the best general advice is to buy a good quality product initially. 1 illustr.

D *Az Bm Chcs Nv/Az Bm Chct Nv*

A method of cutting threads in glass and ceramic tubes

E. J. Klein (National Bureau of Standards). *Rev sci Instrum* 1960 Vol 31 (5) p 571 (May)

In constructing thermo-electric apparatus it was necessary to wind platinum heater wire around Vycor tubes. A jig for use on a surface grinder was designed for this purpose, with a thin diamond blade cutting threads directly in the tubing. The jig may be used on any diamond cut-off saw with a rigid base or work bed. In the instance described, the edge of the blade was 0.015 in. thick and resulted in a 0.018 in. finished cut. It was found that cutting the thread in one cut, rather than in two or more lighter cuts, avoided chipping. The method could also be used for threading hard materials such as tungsten, it is said. 1 illustr.

L *Bl Ceqbd.Ng.1456/Bm Ceqbd Ng.1456*

Modern machine tools break bottleneck in bottlemaking

L. W. Collins jun. *Machinery, NY* 1960 Vol 67 (3) pp 147-152 (Nov)

The costs of mould making operations have been cut by new machine tools and methods described here. 6 illustr. *D* *As Ceq Pr*

The preparation and use of polished thin sections

G. C. Amstutz. *Amer Min* 1960 Vol 45 (9/10) pp 1114-1116 (Sep-Oct)

Describes a way of preparing rock and ore sections which is said to be faster and simpler than the usual methods. Polishing on a lap with abrasives of 1-0.5 μ size is covered. 3 illustr, 3 ref.

D *Be Chm/Bn Chm*

Second Conference of the Czechoslovakian Republic (CSR) on the grinding and polishing of glass. II. Konferenz der CSR über das Schleifen und Polieren von Glas

Anon. *Silikat Tech* 1960 Vol 11 (6) p 246 (June 1) (In German)

The conference was held in Sep 1959, and lectures included the following subjects : (*i*) The scientific and technical level of grinding in the USSR ; (*ii*) modern Soviet conceptions of glass grinding ; (*iii*) problems of grinding and polishing glass ; (*iv*) methods of calculating the particle structure of grinding wheels ; (*v*) a suggested method of distinguishing surface irregularities during the grinding process ; (*vi*) particle analysis of the grinding particle, and its precise determination by photography ; (*vii*) the polishing of thin-walled products with abrasive paper ; (*viii*) polishing theory in the USSR ; (*ix*) production of polishing disks with bonded abrasive particles ; (*x*) intensification of the glass polishing process ; (*xi*) the polishing capacity of iron oxide in relationship to the annealing temperature ; and (*xii*) the stability of polished surfaces.

A *Bm Chc.231.326/Bm Chm.231.326*

Kearney & Trecker machine for facing, taper boring and threading graphite electrodes

Kearney & Trecker-OVA. Ltd, Hove ; Selling agents : E. H. Jones (Machine Tools) Ltd, Portland Rd, Hove, Sussex. *Machinery, Lond* 1960 Vol 97 (2505) pp 1119-1122 (Nov 16)

4 illustr.

D *Az Bhb Cfd Pr/Az Bhb Ceqbd Pr*

Radiation energy transfer and themal conductivity of ceramic oxides

D. W. Lee, W. D. Kingery. *J Amer ceram Soc* 1960 Vol 43 (11) pp 594-607 (Nov)

Polycrystalline specimens of varied micro-structure were obtained and selected specimens were cut on diamond cut-off wheels and ground on diamond impregnated laps. Specimens for infrared measurements were polished as cloth laps using diamond compounds. 23 illustr, 39 ref, 4 tables.

D *Blz Ceg Nvc/Blz Chc Nv/Blz Chm Kmg*

Jearum Mk. V universal diamond lapping machine

British Precision Diamond Tools Ltd, Robin Hood Lane, Sutton, Surrey. *Machinery, Lond* 1960 Vol 97 (2502) pp 976-977 (Oct 26)

The machine produces radii, flats, and chisel points up to 30° included angle, *eg* on diamonds held in a mechanical dop and presented at the required angle to a rotating diamond impregnated lap mounted in a planetary head. Lapping action used is said to permit comparatively quick operation and extended lap life. Additional equipment is available for producing conical diamond points, the work being rotated by an overhead drive is such cases. Operation of the machine is explained. The Taylor, Taylor & Hobson microscope with a magnification of 25× is attached to the head casting. 1 illustr. *D* *F Hpz Nv Pr*

For exact drilling of a concrete core. Für genaues Betonkernbohren

Berg & Schmid. *Die Maschine* 1960 Vol 14 (8) p 34 (Aug) (In German)

Drilling devices incorporating Christensen diamond impregnated cutters, drill up to 100 mm or from 100 to 200 millemeters. The cutters can be changed easily and the device can drill vertically or horizontally, a flow of water washing away the powder.

A *Bny Cfb Nh Pr*

Symposium on cutting ceramics. Arbeitstagung Schneidkeramik

Reinhold. *Die Technik* 1960 Vol 15 (7) p 494 (July) (In German)

A *Bl Ceg.541*

Growing and processing crystal elements

Brush Crystal Co Ltd, Hythe, Hants. *Instrum Rev* 1960 Vol 7 (107) p 1861 (Nov)

The large grown crystals are cut into slabs by milling machines and band saws, and seeds for subsequent growings are cut from the crowns of these large crystals. After the slabs have been cut into strips, the latter are reduced to unit size by band saws. Strip thickness is reduced by surface milling. Other operations are mentioned.

D *Bd Ceq/Bd Vhf*

FP 1,212,933 (Oct 16, 1958) **F. Auriac, Centre National de la Recherche Scientifique**

Automatic apparatus for machining natural or artificial materials and in particular for preparing series of very thin mineralogical plates. Dispositif automatique destiné à réaliser la taille de matériaux naturels ou artificiels et en particulier à préparer en série les plaques minces minéralogiques

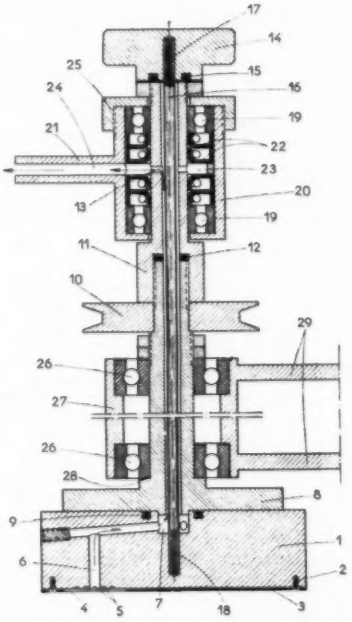


Fig 10. Samples to be ground are held in recesses 4. FP 1,212,933.

The preparation of 0.03 mm thick plates cut from natural rock or from synthetic materials for examination under the microscope has been carried out mainly by hand up to now. A qualified personnel is required and it is impossible to prepare several samples simultaneously, which is especially awkward where a great number of samples must be examined in a short time. The apparatus as represented in Fig 10 to 11 is characterised by a disk 1 rotated in ball bearings on arm 29. The samples to be ground are held in recesses 4 by suction indicated by arrows in Fig 10. Very thin

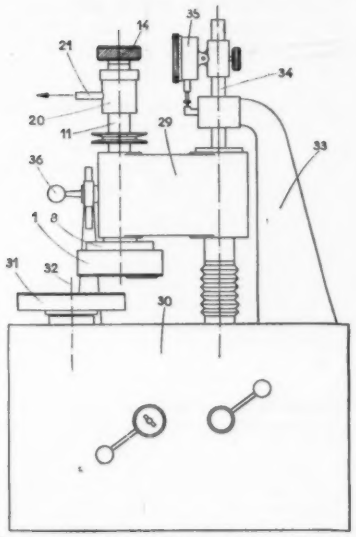


Fig 11. FP 1,212,933.

plates are fixed on glass plates. The rotating disk 1 is lowered onto rotating scaife 31 which preferably has a surface containing diamond powder. (7 claims, 6 illustr). *J* *Bn*

FP 72,248/1,165,087 **A. Stihl**

(Sep 11 ; Dec 7, 1956—conv date, Germany)

Sawing chain for motor driven chain saws, for cutting and sawing hard rock. Chaîne de sciage pour scies a chaîne à commande par moteur, pour le découpage et l'entaillage des roches dures

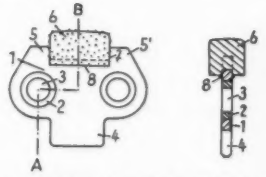


Fig 12 (left) and 13 (right). FP 1,165,087.

The main patent, FP 1,165,087, describes abrasive teeth having a body containing diamond or other hard grains fixed to a link with a T-shaped cross section. These teeth are difficult to manufacture. The new link is a flat plate and the T-shape is produced by the application of the abrasive body to it. The sawing pressure is transferred to shoulders on the link as shown in Fig 12 and 13. (14 claims, 18 illustr).

J *Bn Cej Pcz.545*

GEM POLISHING

Portrait engraving on gemstones. Porträtgravierungen in Edelsteinen

Anon. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (11) p 671 (Nov) (In German)

Very small diamond wheels, used to cut the forms on the cameo, are changed according to the designs being cut. Diamond boart is applied continuously as cutting proceeds, a type of cotton wool being used to clean the parts as they are cut so that they may be checked for accuracy. 1 illustr. *A* *Bb Cp Fd Nv*

What requirements must a brilliant satisfy ?
K. Schlossmacher. *Diamant* 1960 Vol 4 (23) pp 9-10 (July) (In English)
D *Kbb.21*

Using ultrasonic wave techniques and rotating disks in cutting diamonds
P. E. D'iachenko, IU. N. Mizrokhi. *Vest Mash* 1960 Vol 40 (3) pp 60-61 (Mar); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1907 (Sep) (Original in Russian)
D *F Hl Vwghb*

Ultrasonic cutting of diamonds
P. E. D'iachenko, IU. N. Mizrokhi. *Izv AN SSSR Otd tekh nauk mekh i mashinostr* 1960 (3) pp 167-168 (May-June); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1907 (Sep) (Original in Russian)
D *F Hl Vwghb*

Modern diamond grading
K. Schlossmacher. *Gemmologist* 1960 Vol 29 (352) pp 204-207 (Nov)
Deals with subleties of colour, colour and size, inclusions, scientific cuts, and size and value. An internationally adopted grading scale is given.
D *F G.2552.514*

Diamond cutting in the Jura
Anon. *Diamond News* 1960 Vol 24 (1) p 27 (Oct)
The development of the industry in the area is traced and its present-day problems are assessed.
D *F Hl.33*

ROCK DRILLING

Mining practice at the Premier diamond mine
H. F. Hodgson, E. J. B. Sewel. *J S Afr Inst Min Metall, J'burg* 1960 Vol 61 (2) pp 61-89 (Sep)
A brief introduction is followed by descriptions of the mining periods 1903-1932 and 1945-1963. The second period began when the mine was re-opened after 13½ years of stoppage. Two major problems arose, *ie* the methods to use for mining and treating the blue ground. In the first instance, open-cast mining was replaced by a complete underground system; a general discussion of this includes descriptions of drills, bits, and drilling technique. 'Mufulira' type diamond impregnated tungsten carbide coring crowns were used to penetrate hard patches found in the ground where tungsten carbide crowns had failed. 23 illustr, 2 ref.
D *Cfb Nqg.361/Ebd Hd.361*

Deflection diamond drilling at Wabana mines
Staff of Dominion Steel & Coal Corp, Ltd. *Canad Min metall Bull* 1960 Vol 53 (577) pp 309-314 (May)
Normal diamond drilling methods could not be used owing to the character of the submarine bedded iron ore deposits. A method now developed makes it possible to obtain three intersections of an ore seam from one drill hole which is initially directed above the seam and is deflected downward at approximately 500 ft intervals. A concave reamer bit is used, supplied in standard Ax but with coarse stones for soft strate. 9 illustr. *L* *Cfb Nh.1456*

How to forecast accurate drilling costs
O. E. Mecham, M. S. Legge. *World Oil* 1960 Vol 151 (5) pp 112-116 (Oct)
Footage price is usually directly related to the set drilling time and number of bits. The profile method of forecasting drilling penetration rates and bit footages is explained. A table showing a typical drilling analysis chart used in this method includes the use of diamond coring and drilling. 8 illustr.
D *Cfb.252/Cfb Nh.252*

A new etch reading chart
V. Thompson, J. D. Cumming. *Canad Min J* 1960 Vol 81 (7) p 53 (July)
Until recently, several difficulties connected with determining the dip angle of a diamond drill hole by the acid-etch method had made this method cumbersome and inaccurate since human errors often led to serious mistakes. Therefore an etch tube of standard id and glass analysis was adopted, hydrofluoric acid strength being standardized at 4 per cent. Work was then carried out to standardize capillarity correction charts for E and A size drill holes. It is suggested that the chart prepared by the Canadian Diamond Drilling Association and further developed by the authors should be rechecked and reaffirmed for standard use. 1 illustr. *L* *Cfb Nh.21*

Diamond drilling in the Channel
Anon. *Diamond News* 1960 Vol 23 (12) p 7 (Sep)
As part of the preliminary investigations of the geological conditions in the Straits of Dover for the study of the Channel Tunnel possibilities, diamond core drilling from a salvage ship was used.
D *Cfb Nh.321/Cfb Nh.3215*

Wireline diamond drilling in N Rhodesia
D. C. J. Squirell (Diamond Drilling Co of South Africa Ltd). *Diamond News* 1960 Vol 23 (12) p 28 (Sep)
Digest of paper given at 9th annual drilling symposium, Pennsylvania State Univ.
Diamond drilling in the area began in 1927 since when many millions of feet have been diamond drilled from surface and underground. Advantages of wireline diamond drilling are summarized as: (*i*) drilling is safer; (*ii*) average drilling speed is 2½ times greater; (*iii*) diamond cost/ft is reduced; (*iv*) core recovery is higher; (*v*) the technique is best for drilling soft to medium hard rocks; (*vi*) the deeper the hole the better; (*vii*) hole deviation can be minimized by appropriate bit design and control of weight on bit.
D *Cfb Nh.363*

55,000,000 feet of diamond drilling
Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (6) p 5 (Aug)
The St Joseph Lead Co in SE Missouri has been diamond drilling since 1869 when a diamond drill was brought from Vermount with 60 ft of rod. By the end of 1960, some 100,000 holes and a total footage of 55 million feet will have been drilled by this and other companies working in the Lead Belt. *D* *Cfb Nh*

The development of science in the Siberian division of the Academy of Sciences of the USSR
Anon. *Izvestiya Sibirskogo otdeleniya Akademii nauk SSSR* 1960 (1) pp 3-16; *LLU Transl Bull* 1960 Vol 2 (11) pp 945-973 (Nov) (Original in Russian)
Among subjects to be studied are rock drilling problems; properties of rare metals and alloys; and geology and methods of exploration for mineral deposits.
D *Bc.12.1456.21/Bf U.21/Bn Cfb.1313.21*

Undercutting at the King Mine of Asbestos Corporation, Limited

C. G. Harris, R. Sluyter. *Canad Min metall Bull* 1960 Vol 65 (578) pp 392-396 (June)

Diamond drill blast holing is mentioned. 8 illustr, 2 tables, 4 ref. *L* *Cfh Nh*

Fireclay prospecting with back-hoe and core drill

J. D. Haines, J. R. Hudson. *Brick Clay Rec* 1960 Vol 136 (1) p 95 ; *Brit Ceram Abstr* 1960 (9) p 317A (Sep)

Two diamond drills, producing 2¼ in. cores, were put to work following the back-hoe.
D *Cfh Nhe*

Cutter and drill bits

Anon. *Coal Age* 1960 Vol 65 (9) pp 110-124 (Sep)

Bit selection, application, and maintenance are considered. A section deals with diamond drill bits, which are available with various grades of diamond in different stone sizes. In addition to bits with surface-diamonds, diamond impregnated bits are available for drilling very hard, broken, or extremely abrasive ground. Non-coring diamond bits are used for drilling grout holes, drainage holes, and power bore holes where no core is desired. Taper-type diamond drill bits are useful for drilling blastholes in very hard rock. Oriented bits reduce wear, as the diamonds are oriented in the matrix in their hard vector direction. 12 illustr, 5 tables. *L* *Nhh.21/Nhd.21/Nqg.21*

New drift indicator cuts drilling time

G. M. Wilson. *World Oil* 1960 Vol 151 (5) pp 134-135 (Oct)

Faster penetration, fewer bits, and straighter hole is said to result from this tool which signals the hole angle to surface. 2 illustr. *D* *Cfh Pl Psc*

Rock bit grinder

Bitco Inc. *Engng Min J* 1960 Vol 161 (10) p 55 (Oct)

A new version of the firm's pneumatic rock bit grinder includes heavier bearings, improved exhaust location and streamlined guards. The grinder can be operated by any standard compressor unit, and the pneumatic motor provides a wide speed variation. Bits can be sharpened at the site. 1 illustr.
D *Alh Chc Pr*

How to increase bit weight for less cost

J. M. Kellner, A. P. Roberts (Jersey Production Research Co). *World Oil* 1960 Vol 151 (6) pp 131-133, 135 (Nov)

This new hydraulic wall-anchored drill collar is the first tool to provide bit loading without dead weight, it is claimed. 7 illustr. *D* *Pl Ve.252*

USP 2,931,630 (Dec 30, 1957) **D. J. Grady, Hycalog Inc**
Drill bit

The main problem in the design of diamond bits is an efficient cutting arrangement in the centre of the bit and the removal of the cut pieces of the core. The bit described is designed first to form a central core, then to break it and flush it out from the bit. Fig 14 is a perspective view of the bit, partially in section, and Fig 15 shows the end of the bit from below. Fig 16 is a vertical section illustrating the removal of the broken core. The bit is characterised by a core-receiving recess 17 and groove 19 as a passageway for the broken-off core 18. Recess 17 is curved outwardly at 24 to merge into upper wall 25. The core is thus deflected and broken off The fluid courses are so arranged that a relatively large quantity can flow into the core recess to flush out the core. (10 claims, 4 illustr). Ref cited : 3 USP ; 1 Austral P. *J* *Nhb.545*

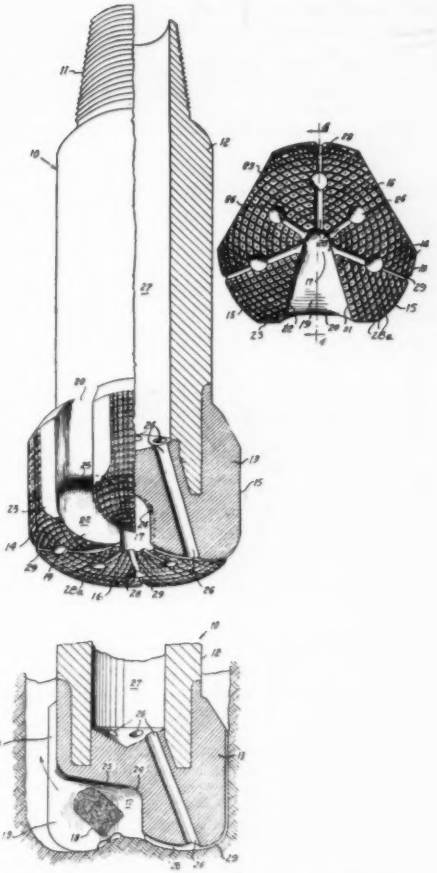


Fig 14 (top left), 15 (top right) and 16 (bottom). USP 2,931,630.

GRINDING AND POLISHING OF CARBIDES AND METALS

Will grinders get more work ?

R. H. Eshelman. *Iron Age* 1960 Vol 186 (7) p 85 (Aug 18)

It is said to be likely that more jobs will be requiring surface grinding operations in the near future. Recent developments in surface grinders have made them suitable for stock removal processes as well as for precision finishing. The grinders also have the greater power necessary to take advantage of improved grinding wheels. 1 illustr.
L *Chcm Pr.132*

REQUESTS FROM AMERICA

American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.

More on Beilby

Anon. *Mineralogist* 1960 Vol 28 (9/10) p 191 (Sep-Oct)

Draws attention to some of the facts which cannot be reconciled with any one theory of polishing. An example quoted is diamond polishing: the general opinion is said to be that this is fine grinding, tumbling of polishing diamonds never being attempted.

D *Chm Nv.21*

Grinding space age materials

J. A. Mueller. *Tool & Mfg Engr* 1960 Vol 45 (4) pp 121-122 (Oct)

Abstract of paper presented at Carborundum Co Abrasives Seminar, May, 1960.

The materials are classified broadly as refractory hard materials and metals. Due to their hardness and sensitivity to heat, these materials must be ground to final size and finish because, grinding makes it possible to avoid stress concentrations that might lower fatigue limits. Grinding can be done on a practical basis to finishes of 40 micro-in. with diamond wheels and finishing with silicon carbide wheels to some 5 micro-inches. Finer grit diamond wheels can bring finish to 2-3 micro-in. when dealing with thermal spray coatings. Diamond wheels, resin bonded to minimize heat and pressure, remove stock rapidly and maintain thin accurate size, while silicon carbide wheels remove little stock but generate high-lustre finishes. Tables recommend wheel specifications and conditions. 2 tables.

D *Ba Chc Nv Urb/Ba Chc Pe Rgc/ Bf Chc Nv Urb/Bf Chc Pe Rgc*

Grinding comes of age

Anon. *Diamond Data* 1960 Vol 1 (5/6) p 1 (June-July)

States that, if present trends continue, abrasive operations may account for more than half of all metalworking. Contributory factors are increasing hardness of materials coupled with decreasing machinability, the demand for better finishes, and the parallel growth of serious research into the theory and practice of abrasion. Current work on the subject is surveyed. One important line of research is into the efficiency of different kinds of abrasive grit for various applications. Investigations at Engelhard Hanovia into the relationship of grit shape and diamond grinding efficiency are quoted as an example. 3 ref.

D *Chc Kl.21/Chc.132.21*

New focus on grinding costs

F. J. Lennon. *Diamond Data* 1960 Vol 1 (2) pp 1-3 (Mar ?)

The author considers that although a new era of grinding technology and economics has arisen various abrasives and methods are developing, yet for the carbide producer and user, the change in diamond grinding is the most relevant. The ample supply of diamonds now available means that economical grinding practices and new applications of diamond wheels can be seriously sought. A good wheel evaluation programme is essential and one is outlined here.

D *Chc Nv.252*

Turning with ceramic oxide cutting materials. Drehen mit oxydkeramischen Schneidstoffen

Rubel. *Technik u Betrieb* 1960 Vol 12 (10) pp 181-183 (Oct) (In German)

Among the topics discussed is finish grinding. The difficulties are mentioned and it is pointed out that grinding with silicon carbide has not proved very successful in practice: diamond grinding wheels grind more easily and more precisely. Recommendations are made for diamond grit size when rough and finish grinding with resin bonded wheels. 1 illustr.

A *Ceqh Pdd/Chc Nv*Chc Pe Rgc*

Mounted wheels—new wall chart showing safe operating speeds

G. R. Blake. *Grits & Grinds* 1960 Vol 51 (1) pp 3-6 (Jan)

Traces the development of mounted wheels, explaining causes of failure, safe maximum speeds, et cetera. Norton Co have produced a new safety wall chart in recognition of the problems associated with the operation of mounted wheels. 4 illustr.

D *Pez Uqf.2595.513*

Know your grinding fluids

E. C. Enos. *Grits & Grinds* 1960 Vol 51 (1) pp 7-13 (Jan)

Offers a logical division of all fluids into three basic groups and three subdivisions of each, according to their principal characteristics. 6 illustr.

D *Sjg*

A method of using mounted wheels on your tool and cutter grinder

Anon. *Grits & Grinds* 1960 Vol 51 (1) pp 14-15 (Jan)

D *A Chc Pez Pr.1456*

What you should know about carbide-tipped saws. Pt 3

A. R. Segal. *Carbide Engng* 1960 Vol 12 (9) pp 22-23, 26 (Sep)

The importance of correct grinding technique is stressed.

D *Alf Bk Chc*

Wax grips honeycomb

R. H. Spiotta. *Machinery, NY* 1960 Vol 67 (3) pp 119-123 (Nov)

Band sawing and disk cutting of honeycomb cores are among operations described. 8 illustr.

D *Az Ceg/Az Cejz*

Levelling smooth surfaces by contact grinding. Das Ausgleichen ebener Flächen durch Tuschierschleifen

H. Strey. *Fertigungstechnik u Betr, Berl* 1960 Vol 10 (10) pp 619-620 (Oct) (In German)

Surfaces not moving against one another, and gliding surfaces, may be levelled by hand shaving or contact grinding. Contact grinding has the advantages that less effort is required and the operators need not be highly skilled.

A *Chcz*

Grinding aluminium with automatic grinders. Das Schleifen von Aluminium mit Schleif-Automaten

Anon. *Galvanotechnik* 1960 Vol 51 (9) p 448 (Sep) (In German)

1 illustr.

A *Bfg Chc Prs*

Effect of heat phenomena in the technological system and properties of the cooling fluid on the precision of finish grinding

P. I. IAshcheritsyn. *Mash Bel* 1959 (6) pp 141-151; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1948 (Sep) (Original in Russian)

E *Chm Sj*

Forces exerted in surface grinding of hard alloys with diamond wheels

R. G. Makhkamov. *Vestn mash* 1960 Vol 40 (4) pp 61-63 (Apr); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1948 (Sep) (Original in Russian)

E *Bfx Chcm Nv*

Increasing the efficiency and precision of grinding on multistone grinding machines

N. P. Lebedinskii. *Avt prom* 1960 (3) pp 38-42 (Mar); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1948 (Sep) (Original in Russian)

E *Chc Pr.132*

Travel report from the USA. Reisebericht aus den USA
C. Klingspor. *Galvanotechnik* 1960 Vol 51 (9) pp 434-435 (Sep) (In German)

A survey of practical experiences in Germany and America in the grinding and polishing of hub caps, *etc*, shows that on the whole the USA produces a higher quality of surface finish on sheet metals. The main difference, however, is that the metal is ground and polished in sheets and shaped afterwards, whereas in Germany the bending and shaping take place before grinding. 1 illustr.

A *Az Chc.322*Az Chc.342/Az Chm.322*Az Chm.342*

Tracking down the unknown in production control
R. B. Parker. *Machinery, NY* 1960 Vol 67 (3) pp 107-111 (Nov)

Described Telecontrol electro-mechanical equipment for registering production data for each machine in a centralized control room, while also providing a signalling and communications system throughout the plant. The application has been on the Cincinnati Micro-Centric grinder used to grind the ball grooves on inner races of ball bearings. 8 illustr.

D *Chc Pr Wp*

Distributor cam grinding
W. F. Johnson, L. B. Edwards. *Grits & Grinds* 1960 Vol 51 (2) pp 5-7, 10 (Feb)

The double head arrangement on the Norton 6 × 30 in. CTV Semi-Automatic Grinder is reported to increase speed of production. An optional cam grinding method using a 'CAM-O-UNIT' device is also described. 2 illustr. *D* *Az Chc Prsb Psc*

New type of diamond grit wheels grinding tiny carbide dies
Gentry Carbide Tool & Die Co, Indianapolis, Ind. *Grinding & Finishing* 1960 Vol 6 (10) pp 73-74 (Oct)

Abrasive wheels made with Engelhard SND grit are reported by Gentry Co to perform well in grinding tiny platinum carbide (Kennametal grade K-501) die inserts. These wheels are used for all platinum carbide grinding, in addition to conventional natural diamond lapping compounds. The material is relatively brittle and difficult to grind and a single dull grain can dull the blanks, but SND's ability to keep cutting sharpness under such grinding conditions greatly reduces this possibility. Experience has shown the grit to be freer and cooler cutting, virtually eliminating the problem of wheel expansion. So far, 37 dies ranging in size from ¼ to 1¼ in. od, have been ground without a single loss from cracking. Resin bonded wheels grind 0.030 to 0.060 in. from both faces and the outer diameter and chamfer the outer diameter, while internal shape is form ground by minute mounted diamond points and is lapped with diamond compound. 1 illustr.

D *Ax Bk Chc Kl Nv/Ax Bk Chd Kmg*

Close-up of Chicago—7
Anon. *Machinery, Lond* 1960 Vol 97 (2507) pp 1230-1234 (Nov 30)

Among machines photographed and described is the Thompson type D surface grinder having power feed to the table which does not require the use of positive reversal stops or dogs. Another feature is a Hoglund pantograph form truing attachment, of fixed 10 : 1 ratio, which will cover a contour 1 in. wide by ½ in. deep.

Another machine is a Natco/Jes-Cal mechanical honing machine shown set-up for sizing pinion bores. It is stated that a tolerance of 0.0003 in. can be maintained for taper, size, and roundness. 10 illustr.

D *Chcm Pr Psf.27/Chh Pr.27*

Current features of automatic broaching machines. Derzeitiger Stand der Automatisierung im Räummaschinenbau
A. Schatz. *TZ f prakt Metallbearb* 1960 Vol 54 (9) pp 410-416 (Sep) (In German, abstrs in English, French, and Italian)

18 illustr. *A* *Cfm Prs*

Superfinish of copper
B. V. Nazaretskii. *Vest mash* 1960 Vol 40 (3) pp 69-72 (Mar); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1948 (Sep) (Original in Russian)

E *Bfh Chs*

How to sharpen Rolls razor blades for microtomy
G. A. Cloud. *Microscope* 1960 Vol 12 (9) pp 227-233 (July-Aug); *Instrum Abstr* 1960 Vol 15 (11) p 626 (Nov)

D *Alz Chcz.1456*

History of the grinding machine
R. S. Woodbury. Technology Press, Massachusetts Institute of Technology, Cambridge 39, Mass; Technology monographs, Historical Series No 2. Price $3.50

Every development in grinding technique is reviewed in this book, from the earliest stone-age flints to modern diamond grinding wheels used on precision machines. A bibliography covers the evolution of grinding both in America and in Europe.

[Not in library of Industrial Diamond Information Bureau]. *A* *Chc Pr.28/Chcw Nv Pr.28*

New magnetic chucks
Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3530) p 833 (Sep 30)

Three entirely new sizes of magnetic chuck have been specially designed for high precision grinding on the largest machines. These are not heavy duty chucks but have been made with a closer pole spacing than is usual on existing large sizes, with provision for mounting end-to-end to give a continuous working surface. The top plates have a central support, which entirely eliminates any tendency to deflection of the surface under load, it is said.

The Eclipse permanent electro-magnetic chuck employs a new system of work holding and is based on a principle which is said to ensure the highest possible magnetic efficiency. *D* *Chcw Pr Psh*

Rotary table automatic machines. Rundtisch-Automaten
H. Kremer. *Galvanotechnik* 1960 Vol 51 (9) pp 439-440 (Sep) (In German)

For working simple workpieces with cylindrical external surfaces, three consecutive procedures are sufficient in principle so that one attachment with three grinding and polishing units are enough. Combined internal and external working is possible on one machine, and for mass-production there is an attachment which can perform several tasks. The Hau Co of Offenbach makes all these machines. 4 illustr.

A *Ceq Prb Psc*

Westwood bore-burnishing tool
Westwood Machine Tool Co Ltd, Camberley, Surrey. *Mach Shop Mag* 1960 Vol 21 (11) pp 711-712 (Nov)

A new micro-adjustable tool for burnishing bores and improving wear resistance of their surfaces by work hardening is available to suit bores from 0.218 to 2.5 in. diameter, larger tools being made as requested. Operating method is described. Only one pass of the tool is needed and surface finishes of 3 micro-in. are said to be obtainable in many cases. 1 illustr.

D *Az Cz Pz*

Centreless super-finishing of small diameter workpieces. Spietzenlose Superfinish-Bearbeitung von Werkstücken mit kleinen Durchmessern

T. Schmidt. *TZ f prakt Metallbearb* 1960 Vol 54 (9) pp 439-443 (Sep) (In German)

Describes the operating principles of a superfinishing machine for continuous working, listing its most essential elements. The introduction is followed by an analysis of the difficulties met when adapting the process to workpieces having diameters from 1.5 to 6 mm, and also by a discussion of the solution of these problems. This includes the feeding of workpieces and the automatic control of such machines. The nature of workpieces selected for final superfinish machining is also covered. 8 illustr.

A *Chs Pr*

Small Center Lapping Machine

J & S Tool Co Inc, Livingston, NJ. *Mod Mach Shop* 1960 Vol 33 (5) pp 308-309 (Oct)

A machine is specially made for lapping centres in small parts and is said to make possible lapping of standard, as well as recessed, centre holes from 1/16 in. diameter at an increased production rate. Opposing high speed spindles are individually driven by 10,000 rev/min motors with reversible switches. One spindle is mounted on ball ways to allow a gentle lapping motion, the workpiece being held in two adjustable vees allowing centre holes to be offset in relation to the diamond lap. Interchangeable impregnated diamond centre laps are an important feature.

D *Az Chd Nv Pr*

Hydraulic surface grinder

William Watts Ltd, Canal St, Nottingham. *Mech World* 1960 Vol 140 (3496) p 477 (Nov)

The Mikromat model SFW has a large, well-supported table with hydraulic traverse giving infinite speed variations up to 60 ft/minute. The plain spindle bearings of special design and the spindle head, which is said to have exceptionally long and rigid bearing surfaces, are claimed to result in maximum accuracy and work finish. A special feature is extremely fine cross feed. 1 illustr.

D *Chcm Prx*

Case report shows savings for electrically-aided grinder

Wendt-Sonis Corp, Hannibal, Mis. *Grinding & Finishing* 1960 Vol 6 (10) pp 54-55 (Oct)

An electrically-assisted grinder is claimed to have made a saving of some $15,000 a year compared with a conventional machine. The method used resulted in savings of two diamond wheels/month, as well as other savings. Details of the case study are given. 1 illustr.

D *Chc Nv Pr***Chc Nv Prd*

Surface finishing machines. Maschinen zur Oberflächenbehandlung

G. Oehler, H. Rectanus. *Industr Anzeig* 1960 Vol 82 (86) pp 1453-1454 (Oct 25) (In German)

Among the surface finishing machines exhibited at Hanover was the Luther & Jordan de-burring and grinding machine, with a grinding tool, consisting of bonded abrasive particles, which can be sharpened with the diamond of a built-in truing device. The Greif plane grinder fitted with a special device for grinding and polishing conical tubes is also described. 3 illustr.

A *Chm Pr Psf:Nj*

'Rutscher' fine grinder. Feinschleifer 'Rutscher'

Anon. *Industriekurier* 1960 Vol 13 (165) p 667 (Oct 26) (In German)

This hand grinder is square, thus permitting grinding in corners; it is said to be easy to handle, and can reach a speed of 2,800 rev/minute.

A *Chcw Pr*

Contour or conventional grinder with tracer or numerical control

Frauenthal Div, Kaydon Engng Corp, Muskegon, Mich. *Mach & Tool Blue Bk* 1960 Vol 55 (9) pp 158, 160 (Sep)

Precision to ±100 millionths of an inch is claimed for the new Frauenthal 1200 Series single spindle vertical tracer- or numerically-controlled grinder. Designed for contour or conventional grinding, the new electro-hydraulic tracer system with ±10 millionths of an inch electrical accuracy reported. Manual control is supplied as standard, and there is a variety of optional equipment and accessories. A continuous recorder of the new tracer system shows deflection, indicating immediately any variation from true contour path between template and work slide and giving a permanent record of contouring accuracy. 1 illustr.

D *Chc Pr Wpb/Chch Pr Wpb*

Twist drill point grinding and thinning machine

Cawi Machine Co Inc, Jersey City 2, NJ. *Mach Tool Blue Bk* 1960 Vol 55 (9) p 325 (Sep)

The Cawi-Spiral machine grinds twist drills and many other two- and three-fluted tools for drilling, milling, and countersinking. Capacity is 1/16 to 1 in. diameter. Specially designed chucks centre and grip the drills on the ground margin and make it possible to change instantly to different diameters. 1 illustr.

D *Albz Chc Pr Psh*

M.S.E. Drillmaster twist drill grinder

Machine Shop Equipment Ltd, Spenser St, London SW 1. *Machinery, Lond* 1960 Vol 97 (2505) p 1144 (Nov 16)

This bench-mounted machine is designed for the accurate grinding of point angles on twist drills from 0.008 to ½ in diameter. Grinding technique is explained. A diamond wheel dresser is permanently mounted in the machine. 1 illustr.

D *Albz Chc Pr Psf:Nj*

Straight air grinder uses solid-rubber wheel

Thor Power Tool Co. *Iron Age* 1960 Vol 186 (8) p 103 (Aug 25)

No mechanical-locking devices are needed for holding the abrasive belts on the solid-rubber grinding wheel, as they are held by centrifugal expansion of the wheel. The resilient wheel does not bounce like a solid wheel, and is said to give continuous balance and finer finishes. The grinders are available in speeds of 4,500 or 6,000 rev/minute. 1 illustr.

L *Chc Pe Smt:Pr*

Shaft-lapping machines give good microfinishes

Foote-Burt Co. *Iron Age* 1960 Vol 186 (8) p 108 (Aug 25)

Machines using coated abrasive cloth can lap any shaft size up to 84 in., and provide a 4 to 7 micro-in. finish. Bearing surfaces and fillets are lapped in one operation, jobs of this nature being impossible by honing, and impractical by grinding. Lapping takes place under a flood of coolant. 1 illustr.

L *Az Chd Pee Pr*

Drill grinder

McDonough Mfg Co, Eau Claire, Wisc. *Mod Mach Shop* 1960 Vol 33 (5) pp 236-237 (Oct)

Model 'DF' Sterling drill grinder is said to quickly, easily, and accurately grind 59° drills with a free cutting conical form on all sizes from ¼ to 2½ in. diameter. Since no chucks or collets are needed, changing set-up time is shortened. Locating the drill at the cutting edge of the lip being ground produces an accurately centred drill that holds hole size to very close tolerances it is claimed. A built in diamond dresser is standard.

D *Alb Chc Pr*

Horizontal stacking speeds microhoning

Micromatic Hone Corp. *Tooling & Prod* 1960 Vol 26 (8) p 53 (Nov)

Describes a single spindle horizontal model 5HX16 Hydrohoner adapted to horizontal stack Microhoning and used for operations on connecting rod bores at a gross rate of 1/5 sec, while generating geometric accuracies within 0.002 inch. The process can also be applied to bores of rocker arms, milling cutters, and other parts whose bore lengths are short compared with their diameters. 2 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A77 (Mar).

D *Az Chhc Pr*

Worm grinding machine HSS 33 B. Schneckenschleifmaschine HSS 33 B

W. Ferd Klingelnberg Soehne, Remscheid. *Maschinenwelt u Elektrotechnik* 1960 Vol 15 (10) p 429 (Sep) (In German)

This machine incorporates a double cone grinding wheel of 485 mm maximum diameter, but which can be worked down to 300 mm, said to ensure very economical use. The grinding spindle lies obliquely to the table and the dressing tool is fixed above it. The dressing diamonds, two for the sides, and one for the outside diameter of the wheel, are operated hydraulically, controlled by a button. The grinding carriage moves automatically, so that the grinding surface maintains its position to the workpiece. The machine has a large work capacity: worms with a diameter of 10-325 mm, and moduli of 0.5 to 25 mm can be ground. The greatest grinding length at 30° angle of inclination is 450 mm, as it remains at the greatest possible angle of inclination, 40 degrees. 1 illustr.

A *Chcq Pr Psf:Nj*

High speed precision hand grinders

McGonegal Mfg Co, 135 Mozart St, East Rutherford, NJ. *Mod Mach Shop* 1960 Vol 33 (5) pp 292-293 (Oct)

Themac Type J-50 and Type J-80 are said to be ideal tools for deburring, grinding, polishing and carving on all types of materials. They are precision built for tool, die and pattern work, precision grinding in the lathe and all types of production work. 1 illustr.

D *Chcw Pr*

Cylindrical type grinder finishes flat surfaces

Acme Mfg Co, Detroit, Mich. *Tool & Mfg Engr* 1960 Vol 45 (5) p 91 (Nov)

Weld flash on flat and non-cylindrical surfaces is ground on this rotating axle-housing grinder. Grinding is accomplished by two adjustable heads mounted on a reciprocating slide which insures uniform grinding wheel wear. 1 illustr. *D* *Chcm Prb*

S & B screwing machine

Anon. *Metalworking Prod* 1960 Vol 104 (44) pp 83, 85 (Nov 2)

An integral chaser grinding fixture is incorporated at the rear of the machine, and there are cutting-off and deburring attachments. One deburring cutter covers all sizes from ¼ in. to 2 inches. 1 illustr.

D *Az Chc Pr Psc*

New idea in chamfering, deburring tools

Jancy Engng Co, Davenport, Iowa. *Carbide Engng* 1960 Vol 12 (9) pp 42-43 (Oct)

Design of the tool is said to curl the chip up and away from the work which eliminates the forcing of any metal into the edge of the opening; nor is a ridge formed around the opening. Re-grinding is claimed to be simple. 1 illustr. *D* *Abz Cfl*

Cincinnati grinding, profiling, and milling machines

Cincinnati Milling Machine Div. *Machinery, NY* 1960 Vol 67 (3) pp 156-157 (Nov)

Includes a description of the first numerically controlled centre type cylindrical grinding machine. 3 illustr. *D* *Chcl Pr Wpb*

Internal grinding machine. Machine à rectifier les intérieurs

Société Sozet & Cie. *Mécan Electr* 1960 (136) pp 101-102 (Sep) (In French)

The machine described has a diamond holder which is hydraulically controlled with the aid of a micrometric screw. Specifications are given.

A *Chcn Pr:Nj Psfb*

Cutter grinding attachment

Hunt & Sons Ltd, Old Trafford, Manchester 16. *Mach Lloyd* 1960 Vol 32 (20A) p 37 (Oct 1)

Tool and cutter grinding machines with vertical spindles can be fitted with this cutter grinding attachment. The device is designed for use when grinding the profiled form of drill fluting cutters or similar tools and is claimed to possess certain advantages when compared with the equivalent operation of turning in a form relieving lathe. The attachment will take cutters from 1½ to 6½ in. diameter and from ¼ to 3½ in. wide, and requires a grinding wheel of approximately 4 in. diameter. 1 illustr.

D *A Chc Pr Psc:Alc Chc*

Swiss P 344,008 (May 2, 1956) **A. Rickenmann, Reishauer-Werkzeuge AG**

Method and machine for grinding gear wheels. Verfahren und Maschine zum Schleifen von Stirnzahnrädern

(5 claims, 10 illustr).

D *Add Chc Pr.545*

Swiss P 344,634 **R. Lüscher**

(Sep 15, 1957—conv date, Germany)

Tool grinding machine. Werkzeugschleifmaschine

The machine operates with two parallel horizontal grinding spindles 1 and 2 as shown in Fig 17 and 18. Both are diamond wheels, one for rough grinding and the other one for finish grinding, *ie* lapping. The work table 3 is arranged above a vessel for collecting the coolant to be recirculated to the wheels. The table is tiltable on pivots 4 about a horizontal axis parallel to the plane in which the wheels rotate. The angle may be 15° or greater. The position is adjusted by a screw 5 through hand wheel 8 and secured by a cam device on rocking table 15 mounted on spring blades 16 in housing 17, so that table 15 and work table 3 can be slightly moved horizontally to the right or left and parallel to the rotational plane of the grinding wheels. The table

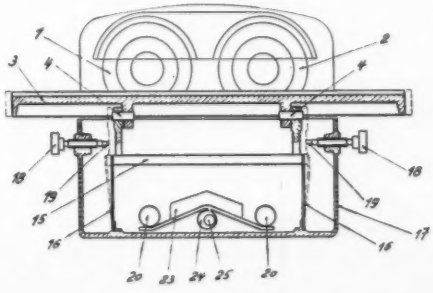


Fig 17. Swiss P 344,634.

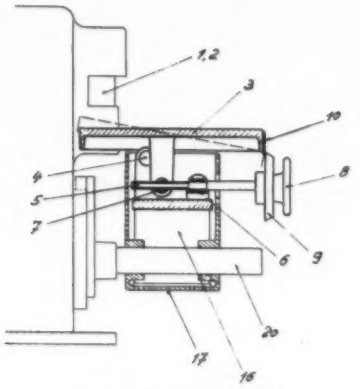


Fig 18. Swiss P 344,634.

is also adjustable vertically. The lateral rocking movement facilitates tool grinding and lapping, while the general arrangement of the wheel enables the operator to grind a tool on both wheels without changing his position. (6 claims, 6 illustr).
J *Al Chc Pr.545*

MACHINING DEVELOPMENTS

Hot milling superalloy boosts tool life
Anon.. *Metalworking Prod* 1960 Vol 104 (48) pp 58-60 (Nov 30)
3 illustr. *D* *Bfxz Cffz*

Eectrochemical machining at economic speeds
Battelle Memorial Institute. *Metalworking Prod* 1960 Vol 104 (48) pp 68-69, 71 (Nov 30); *Financial Times* 1960 (22261) p 13 (Dec 9)
The fast developing metal cutting technique of electrochemical machining has lately attained economic rates of cut, *ie* 0.05 to 0.1 in./min as a result of research. Equipment has been developed for drilling, trepanning, contouring, and set cut-off. Tungsten, molybdenum, hot-work tool steels, and stainless steels are among the materials which have been worked successfully. 2 illustr. *D* *Bf Ceqz*

Electron beam processes for microcircuit fabrication
T. Maguire. *Electronics* 1960 pp 59-63 (July 15); *Pera Bull* 1960 Vol 13 (10) p 266 (Oct)
Describes possible applications for, and developments in, electron beam machining.
X *Ceqz*

Electrolytic polishing of stainless steels
Y. P. Trehan, S. P. Bhadra, P. K. Gupte. *NML Tech J* 1960 Vol 2 (2) p 8; *J sci industr Res* 1960 Vol 19A (10) p 67 (Oct)
D *Bfdb Chmk*

Ultrasonics boost metal finishing
P. W. Sherwood. *Carbide Engng* 1960 Vol 12 (9) pp 18-19, 26 (Sep)
Covers deburring applications and ultrasonic machining. 1 table. *D* *Bf Chm Vwghb*

Close-up of Chicago—3
Anon. *Machinery, Lond* 1960 Vol 97 (2503) pp 1011-1020 (Nov 2)
Among machines photographed and described is the Ex-Cell-O type 264 electrolytic tool grinder with provision at the front for sharpening carbide tool tips, and at the rear for grinding chipbreaker grooves. A low-voltage current, flowing through a conductive fluid between the metal bond of the diamond wheel and the tool, removes material from the tool face. The diamond particles act as insulators and spacers to allow passage for the fluid and do very little cutting themselves, being mainly used for clearing away the residue left by electro-chemical action.
The Thompson type C Tapeforming surface grinder is also illustrated. The machine is for grinding of continuous-path contours to an accuracy of 0.001 in. and is controlled by punched tape. 20 illustr.
D *A Chc Nv Pr.27/Chcm Pr Wpb.27*

Electrospark unit uses soft tools to cut intricate shapes in carbide
Ex-Cell-O Corp, Detroit 32, Mich. *Mach & Tool Blue Bk* 1960 Vol 55 (9) p 141 (Sep)
The Ex-Cell-O Electrospark Model 244 uses relatively soft tool materials, such as copper, brass, or steel, to cut intricate shapes in carbides and similar hard and conductive materials with little tool wear, it is claimed. The process is explained. 1 illustr.
D *Bk Ceqm Pd Rw/Bk Ceqm Pd Sbb/Bk Ceqm Pd Sbdc*

Machining in miniature by electron beam
Carl Zeiss, Oberkochen/Wuerlt; British rep: Degenhardt & Co Ltd, Cavendish Sq, London W 1. *Mach Lloyd* 1960 Vol 32 (20A) pp 20-22 (Oct 1) (In English, French & German)
Describes a milling machine for production of miniature non-circular holes and test profiles, and a machine for drilling bearing jewels. 2 illustr.
See also *Industr Diam Abstr* 1960 Vol 17 p A110 (Apr); p A153 (June). *D* *Cfbm Pr*

Present state of development in the field of electrolytic grinding. Möglichkeiten und Aussichten des Elysierens
S. Spizig. *TZ f prakt Metallbearb* 1960 Vol 54 (9) pp 416-418 (Sep) (In German)
Besides the mode of operation, range of application, and the potentialities of this process, the author refers to new types of electrolytic grinding machines. 4 illustr, 4 ref, 1 table. *A* *Chcr.132*

High-temperature machining solves space-age metal-cutting problems
W. Pentland, J. L. Wennberg, C. L. Mehl. *Tool & Mfg Engr* 1960 Vol 45 (5) pp 92-98 (Nov)
Describes results of research by The Cincinnati Milling Machine Co and by the US Air Force aimed at demonstrating the benefits of high temperature machining on a practical production basis. Orthogonal turning, drilling, and turning tests and results are summarized. It was concluded that no detectable change in microstructure was apparent but micro-hardness checks showed that tempering occurred when the tempering temperatures were exceeded. Depth of tempering varied. Surface finish equalled that obtained when machining at room temperature, though some surface oxidation occurred at the higher temperatures. Workpiece distortion problems could be met by better heat localization. Hot machining should be considered for immediate use on high strength material where conventional cutting is difficult, it is stated. 10 illustr.
D *Bf Ceq Vbb*

Surface deburring and finishing. Ebarbage et finition des surfaces

P. Desemery. *Mach Mod* 1960 Vol 54 (618) pp 104-106 (Sep) (In French)

A barrel finishing method is described in which the pieces being treated are subject to chemical action as well as abrasion. The factors concerned are discussed in detail; the method is said to be particularly valuable for uneven surfaces that are difficult to grind by other methods. *A* *Az Chm.1456/Az Cz.1456*

EP **830,917** (Aug 21, 1957) **D. W. A. F. Rudorff, Sparcatron Ltd**

Methods and apparatus for shaping, grinding or polishing articles of electrically conductive materials

The invention has special reference to such articles as turbine or compressor blades which are usually ground on belt grinders. In order to work such shapes by spark-machining methods, an electrode in the form of a continuous and resilient band or belt is used. The electrode may be of metal, although advantageously it is of metallised fabric or rubber or rubber impregnated fabric with staples through the fabric or to a conductive operative layer at the other surface of the fabric. The staples may be open-ended at the operative face of the belt or projecting into abrasive contact with the surface of the workpiece. Electrode and/or workpiece may be vibrated at high frequency during the spark-machining operation. (12 claims, 4 illustr).

J *Az Bz Ceqn.545*

Swiss **P 344,492** **H. Axer, Beteiligungs- und Verwaltungs GmbH** (July 20, 1955—conv date, Germany)

Device for controlling the feed of the electrode for the electro-erosive machining of metals. Vorrichtung zur Vorschubregelung der Elektrode bei der elektro-erosiven Bearbeitung von Metallen

It is important to maintain the distance between the electrode and the workpiece at a constant value for the electro-erosive machining of, *eg*, hardened steel and hard metals. On the other hand, the distance is constantly changing because of metal-removal and burn-up of the electrode. The use of a control magnet in series with a capacity and the spark gap and a lever transmission including springs is known. The new device also operates with a control magnet which is however parallel to the spark gap and a capacity, while the control movement is transmitted through an hydraulic piston to the operating piston carrying the electrode. (2 claims, 1 illustr).

J *Bf Ceqn Ptc.545*

DAS **1,078,857** **H. E. de Bruyn, NV Philips' Gloeilampenfabrieken** (Sep 6, 1955—conv date, Netherlands)

Device for machining a workpiece by means of an electrode connected to a potential. Vorrichtung zur Bearbeitung eines Werkstücks mit Hilfe einer an einer elektrischen Spannung liegenden Elektrode

(4 claims, 1 illustr).

J *Ceqm Ptc.545*

PRODUCTION, GRADING & RECOVERY OF ABRASIVE PARTICLES

Bond-ability and break-ability

Anon. *Diamond Data* 1960 Vol 1 (5/6) p 4 (June-July)

By varying the shape of natural diamond particles, it is possible to achieve the desired balance between these two properties.

D *Km Nq Uni/Km Nq Usc*

Particle shape and grinding efficiency

C. W. Highberg, E. A. Hausman (Englehard Hanovia Inc). *Diamond Data* 1960 Vol 1 (7/8) pp 1-4 (Aug-Sep)

The importance of the influence of particle shape on grinding, lapping, and honing efficiency of the grit has now become evident and recent practical and theoretical tests in the Engelhard laboratories have confirmed the advantages of particular shapes, especially as they affect diamond grit efficiency. Theoretical considerations are summarized and it is stressed that from such a viewpoint, the nature of the bond in relation to particle efficiency makes it important to differentiate between the two fundamentally different engineering relationships as they affect resin bonds at one extreme and metal bonds at the other, with vitrified bonds in between. Laboratory evaluation of theory is discussed and a technique for defining quantitatively the sample characteristics of batches of abrasive grit is described. Tests designed to correlate shape and efficiency more precisely are also explained. Research continues and diamond wheel manufacturers, using both laboratory facilities and the facilities of diamond wheel users, are co-operating in evaluating the relationship between shape and efficiency under controlled conditions. Although it is too early yet to match grit, bond, and particular grinding requirements, the practical implications of these laboratory tests as they affect diamond grinding efficiency should be forthcoming in the near future. 1 illustr, 2 tables. *D* *Chc Kl.1341*

Automatic particle size determination from microradiographs

O. M. Barlow, W. B. Distler, J. L. Hile. *Non-destr Test* 1960 Vol 18 (5) pp 341-343 (Sep-Oct)

For automatic counting and sorting of very small particles and solids, thin sections were radiographed, enlarged by photography, and electronically scanned and sorted on a microphotometer and a pulse-width analyser. This discussion considers a method of automatic counting and sorting large numbers of very small particles embedded in solid plastics or light metals. The procedure could be applied to sorting particles in liquid suspensions although there are faster and cheaper commercial methods available. Basic procedure is described, including preparation of materials. For producing an even, very thin shaving, free of ripple or excessive curling, a microtome with a blade of acute taper was used. The finest hone was necessary; ½ μ diamond performed well as a honing medium, leaving no feather edge to cut ridges. 2 illustr, 2 ref. *D* *Az Chh Nqe/Vgf.1456*

Routine measurement of particle size distribution of fine dust precipitate in a thermal precipitator with the help of an electron microscope. Zur Routinemessung der Korngrössenverteilung von Feinstaub-Niederschlägen im Thermalpräzipitator mit Hilfe des Elektronenmikroskopes

I. Westerboer. *Staub* 1960 Vol 20 (10) pp 361-364 (Oct 1) (In German)

The difficulty of electron microscopic particle analysis in thermal precipitators lies in the varying particle distribution. Two methods of particle analysis are investigated. In the well-known method, the small particles are brought together for analysis on a strip oblique to the separating line; in the other, particle size is analysed from just one electron microscopic photograph. The Walkenhorst thermal precipitator is suitable for this application. A simple method of preparing the test dust is described in detail. 2 illustr, 11 ref. *A* *Vgf Wcmm*

Chemical microscopy in the optical industry

G. Crossmon. *Symposium on Microscopy, ASTM Spec Tech Publ* No 257, 1959, 29 pp ; *Brit Ceram Abstr* 1960 (8) p 313A (Aug)

Some improvements in equipment and techniques are described for the microscope determination of the particle size of abrasives, polishing, buffing materials, and other materials encountered in the manufacture of glass optics and scientific instruments.

D *Rd Vgf Wcm.1456*

Quartz for I.C.B.M.

A. E. Williams. *Min Mag, Lond* 1960 Vol 103 (4) pp 214-217 (Oct)

Includes descriptions of different ways of controlling particle size of the quartz produced by the air separator. 3 illustr. *D* *Bcb Cc Vu.134*

Materials [:] Alkaline deburring compound for use in tumbling barrels

Oakite Products Inc, 126 Rector St, New York 6, NY. *Machinery, NY* 1960 Vol 67 (3) p 125 (Nov)

Oakite FM 182 incorporates 40 to 80 mesh abrasive to speed cutting action and so shorten deburring cycles in the finishing operation. It is said to have no adverse chemical action on metals.

D *Chmz Rdz*

New grinding material. Neues Schleifmittel

Anon. *Industr Anzeig* 1960 Vol 82 (85) p 1417 (Oct 21) (In German)

Tungsten carbide particles in steel, having a degree of hardness of 9.7, are said to be especially suitable for working natural wood and wood materials.

A *Chc Rhb*

Determination of average particle size of metal powders by the Fisher subsieve sizer

Metal Powder Industries Federation Standard 1960 (32-60) 4 pp ; *Metal Powd Rep* 1960 Vol 14 (12) p 215 (Aug)

The standard specifies the procedure for standardizing the Fisher sub-sieve sizer and determining the average particle size in microns of the sub-sieve fraction of metal powders. The principle of the Fisher instrument is explained, and the apparatus is described with the help of diagrams.

See also *Industr Diam Abstr* 1960 Vol 17 p A223 (Sep).

D *Rn Vgf.1456.255*

New abrasive and fine abrasive tools. Neue Schleif- und Feinschleifkörper

Anon. *Galvanotechnik* 1960 Vol 51 (9) pp 460-462 (Sep) (In German)

The development of plastics led to the production of plastic abrasive particles. The properties required in a plastic for this use include good adhesion to the binder : the polyvinyl combinations fulfil this and other requirements. The peculiar properties of plastics permit the manufacture of tools which can be adapted to the surface of the workpiece, and which retain their shape because of their hardness. Additionally, they have a high degree of porosity, and act more gently than particles embedded in other materials ; one or two grinding operations can be saved. They should only be used for dry grinding, although smooth surfaces may be ground next if a speed of 8-10 m/sec is not exceeded. The bodies are made in standard sizes.

A *Chc Rdb Ss.132*

LITERATURE REQUESTS

Please quote the page number of the Bibliography containing the original reference, and the author and title of the article, in all cases.

TOOL PRODUCTION

Quick setting cutters

Anon. *New Scientist* 1960 Vol 8 (207) p 1186 (Nov 3)

Describes a type of milling cutter, developed in Czechoslovakia, using quick-setting blades which is reported to have cut costs and reduced production times by as much as half. Only a thin layer of tool material need be ground away, it is claimed, and thus average cutter life has been raised by 50-60 per cent.

D *Pdz*

New system of polishing machines

V. V. Rukin, D. I. Shil'krut. *Der prom* 1960 Vol 9 (3) pp 13-14 (Mar) ; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1948 (Sep) (Original in Russian)

L *Chm Pr*

Spring manufacturer increases production with tungsten carbide tooling

Adamas Carbide Corp, Technical Service Div. *Mod Mach Shop* 1960 Vol 33 (6) p 158 (Nov)

Use of Adamas Grade HD-25-T, a special purpose tungsten carbide die grade with a high percentage of cobalt is said to have solved a difficult spring cutting problem at Illinois Coil Spring Co, Chicago. Wear was too slight to justify removing the knife for sharpening after using Adamas No 1490 blanks in this special grade for cutting 65,000 springs at 800/hour. One blank is used as a guide knife and another as a cut-off knife. The knife used to cut chrome silicon 0.156 in. diameter wire is of the same HD-25-T grade, and has achieved similar good results.

See also *Industr Diam Abstr* 1960 Vol 17 p A158 (June). *D* *Az Ceg Rgd*

Throw-away tipped drills

Detroit Reamer & Tool Co, 780 W Maple Rd, Birmingham, Mich. *Tooling & Prod* 1960 Vol 26 (7) p 118 (Oct)

This new type of oil hole drill, the Bi-Tip, features two flute replaceable tips available as carbide tipped, solid tungsten carbide, or solid high speed steel. After repeated sharpenings have expanded usable cutting tip area, a new tip can be brazed to the undamaged body at a fraction of original drill cost, it is claimed. 1 illustr. *D* *Pl*

Hot forged twist drills

Rohde & Doerrenberg, Duesseldorf. *Mach Shop Mag* 1960 Vol 21 (11) pp 695-697 (Nov)

The hot forging process is said to produce a drill better than one machined by milling or grinding. Technique is explained. Photographs show Vickers hardness indentations in a forged drill and in a drill machined from the solid. 9 illustr.

D *Alb Chc Unhcc* Alb Ckf Unhcc*

Prehoned disposable Carboloy inserts

General Electric Co, Metallurgical Products Dept, Detroit, Mich. *Machinery, NY* 1960 Vol 67 (3) p 236 (Nov)

Carboloy (R) Prehoned disposable inserts are now available in any quantity and most standard grades. Tests are said to have shown that predictable tool life is 35% longer than that of unhoned inserts and a substantial improvement on life of hand-honed inserts. In addition, harder, more durable grades can be utilized. Other advantages are outlined.

D *Pdcb Uqe*

Photoelastic study of stresses in a cutting tool using cinematography

G. S. Andreev. *Vestnik mashinostroeniya* 1958 (5) pp 54-57 ; *LLU Transl Bull* 1960 Vol 2 (11) pp 976-984 (Nov) (Original in Russian)

Designed for filming the stress state in a tool during steady cutting, this device will be particularly useful for determining stresses in tools working under conditions of intermittent cutting, it is stated. In this application, the photo-elastic method combined with cinematography will reveal causes of fractures and will indicate ways of improving the design of carbide tipped cutting tools. 8 illustr, 3 ref.

D *Ceg Pdc Unq Vw Wcf*

Progress in boring and grinding

Anon. *Mech Engng, NY* 1960 Vol 82 (11) pp 90-91 (Nov)

Digest of paper by A. F. Townsend (Heald Machine Co), given at National Tool Exhibition, Chicago, 1960.

Among recent improvements in precision grinding technique is mounting of the wheel head on a table inclined at a 30° angle : this provides positive back-up against wheel pressure, while faster stock removal cuts cycle time. If the quill is stiff enough proportionately, grinding can be as fast as the wheel and work can take the load, it is stated. General achievements and aims of designers of precision grinders and boring machines are cited. 2 illustr.

D *Cfd.132/Chcw.132*

Carbide grade change eliminates severe edge wear

Corrugated Box Machinery Corp, Linden, NJ. *Machinery, NY* 1960 Vol 67 (3) p 248 (Nov)

Describes improvements that resulted when Adamas 434 carbide grade was used on a Warner & Swasey hydraulic turret lathe when turning 1045 hot-rolled carbon steel blanks for gears. The grade is designed specifically for machining steel with heavy feeds and is said to combine good resistance to shock, wear, and cratering. One cutting edge of one insert completely rough and finish turns all sixteen gear blanks.

D *Ceqh Pdch Pr Unr*

Getting the most out of milling

C. Sharp (Brown & Sharpe Mfg Co). *Tool & Mfg Engr* 1960 Vol 45 (5) pp 75-77 (Nov)

Shows how modern cutter materials, improved cutter geometries, and changes in milling techniques can enable the best results to be obtained. 3 illustr.

D *Cff.21*

Selection of hard metals employed for chip producing machining. Zur Wahl der Hartmetallsorten für die spanende Formung

H. J. Burmester. *TZ f prakt Metallbearb* 1960 Vol 54 (9) pp 419-422 (Sep) (In German, abstrs in English, French, and Italian)

Includes indications as to the uses and the limits of the types available for universal use. The causes and criteria of wear incurred through constant and interrupted cutting operations are elaborated. 5 illustr.

A *Ceq Pdc.21*

Diffusion bonding of cemented [sintered] carbide to steel

J. F. Kuzmick, G. B. Goodfellow. *Proceeding of General Session on Powder Metallurgy* 1959 pp 14-21 ; *Metal Powd Rep* 1960 Vol 14 (11) pp 201-202 (July)

Many potential applications for tungsten carbide tools cannot be realized owing to insufficient strength of joint between the carbide tip and the steel shank. The authors have developed a special material, called 'Plymet', for bonding the tip to the shank.

D *A Bkcb Cs*

Controlling precision of machine tools. Le contrôle de la précision des machines-outils

L. Champetier. *Cour Normalis* 1960 Vol 27 (153) pp 279-284 (May-June) (In French)

After a discussion of definitions and measures involved, the test conditions are considered and the two problems which arise for each type of machine tool are clarified, *ie* determination of the nature and order of control operations ; and the fixing of tolerances to be set for each of these operations. 4 illustr, 1 table.

A *Ceqz Pr Wp*

How to cut tool and die costs. Pt 2—Increasing tool life

J. S. Pendleton jun. *Tool & Mfg Engr* 1960 Vol 45 (5) pp 110-113 (Nov)

Steel selection, surface finish, tool-making techniques, and heat treatment are important variables influencing tool life. This article explains the ways in which these variables can be controlled to reduce costs. 6 illustr.

D *Th Uqe.252*

Revolutionary innovation in grinding and polishing. Umwälzende Neuerung in der Schleif- und Poliertechnik

H. Petter. *Metalloberflaeche* 1960 Vol 14 (11) p 354 (Nov) (In German)

A Solingen firm has produced a semi-automatic apparatus for the application of fluid compound to the grinding wheel by means of a spray-gun : this ensures that the correct amount is applied. The advantages of fluid compound are mentioned, and it is claimed that this method has proved very economical in both English and American industry. The same firm makes the compounds, which are homogenous and can be used for all work from rough grinding to super-finishing. 1 illustr.

A *Chc Prsh.132/Chm Prsh.132*

BP 831,121 **W. Ladinsky**

(Apr 21, 1955—conv date, France)

Diamond trueing devices for abrasive cutters

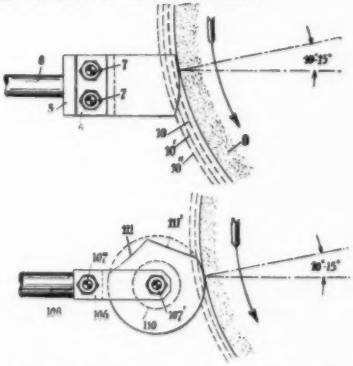
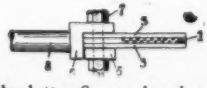


Fig 19 (top), 20 (centre), 21 (bottom). BP 831,121.



A thin flat layer of a diamond bearing metal matrix is fixed between steel plates bolted to a holding member as shown in Fig 19, 20, and 21, the latter figure showing a rotatable arrangement of the clamping plates so that a worn portion can be replaced readily by an unused portion simply by turning disk assembly 110. The diamond grains should be in one or two layers only so that the layer is sufficiently thin for the required precision of the work. (6 claims, 9 illustr).

J *Pe*

USP 2,926,469 (Apr 17, 1957) **L. M. Kubsh, Gardner Machine Co**

Abrasive disks and method of making it

(8 claims, 2 illustr). *D* *Pe Qc.545*

DAS 1,078,896 (Aug 18, 1956) **C. W. Gehring**

Honing tool for precision machining of holes of very small diameter. Honwerkzeug zur Feinbearbeitung von Kleinstbohrungen

Holes of less than 1 mm diameter cannot be worked with adjustable hones owing to a lack of space for the required mechanism. Therefore pins carrying an abrasive film are often used, which however are not satisfactory for such small holes because the abrasive particles cannot be embedded in the hardened steel pins and are thus split up without proper cutting action. In addition, these tools are subject to rapid wear and work must proceed in numerous steps, usually increasing the diameter of the tool by 0.002 mm for each step. The new tool consists of a thin resilient steel wire carrying an abrasive of smaller diameter than the hole to be honed. The abrasive may be sintered on to the wire or bonded by a synthetic resin. The wire is bent to be out of balance as shown in Fig 22 at 9 and 10. Fig 23

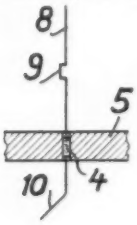
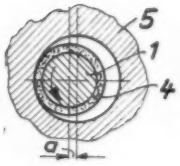


Fig 22 (top) and 23 (bottom). DAS 1,078,896.



is a magnified cross section of wire 1 with abrasive layer 4 in workpiece 5, its eccentricity being a. Its rotational speed lies in the range of 100,000 rev/minute. (6 claims, 4 illustr). Ref cited : 1 GP ; 1 DBP ; 1 FP : 4 USP.

J *Az Chh Pgk.545*

POWDER METALLURGY

Metalworking report . . . cutting

Ferro Powdered Metals. *Amer Mach* 1960 Vol 104 (22) p 2 (Oct 31)

Powdered-metal toolholders that absorb vibration and conduct heat away from the mechanically clamped cutting inserts are now being marketed. The material is copper-infiltrated powdered iron, claimed to have four to five times the life of conventional holders and to improve insert life of single point, cut-off, and milling cutters. The line is called 'Ferro Damp', after the vibration damping qualities of the powdered metal.

D *Psp Rng*

Metal powders : Directory of commercially available grades and types

Anon. *Metal Powd Rep* 1960 Vol 14 (11) p 212 (July)

Book, Metal Powder Industries Federation, New York. 1960, 50 pp.

This well-produced illustrated booklet gives detailed information on the powders manufactured by 23 member companies of the Metal Powder Producers Association, a trade division of the Federation Compositions and properties are tabulated, and, in many cases, the most suitable applications are pointed out.

[Not in library of Industrial Diamond Information Bureau]. *D* *Rn.56*

Swiss P 343,648 **G. W. Lucas, General Electric Co** (May 13, 1954—conv date, USA)

Hard metal alloy. Hartmetall-Legierung

(7 claims, 4 illustr). *D* *Rh.21.545*

DAS 1,075,839 **K. M. Taylor, Carborundum Co** (May 17, 1952—conv date, USA)

Method of producing refractory sintered carbides. Gesinterte feuerfeste Hartmetallegierung

(2 claims). Ref cited : 1 DBP ; 1 BP ; 1 USP.

D *Rh.545*

MISCELLANEOUS

Use of diamonds in mechanical engineering

IA. B. Mindlin. *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1907 (Sep) (Original in Russian)

Pamphlet, Izd-vo Znanie, Moscow. 1960, 39 pp, Ser 4, Nauka i tekhnika No 11.

[Not in library of Industrial Diamond Information Bureau]. *D* *Fc Vwkb*

Steel selection simplified by new 'Steelector'

Allegheny Ludlum Steel Corp. *Tooling & Prod* 1960 Vol 26 (7) p 68 (Oct)

The Steelector programme covering eighteen grades of tool steel is said to handle 96% of all tool steel applications, and to provide a number of selection aids. The programme is intended to lower inventories and simplify choice for the user. Specific information as to characteristics, heat treatment, application, and availability of the grades is given, as well as card charts to aid selection. *D* *Bfd Ccb*

Research on the dynamic rigidity of machine tools. (I)

M. Honda, T. Yasui. *J mech Lab Japan* Vol 5 (2) pp 101-106 ; *Instrum Abstr* 1960 Vol 15 (10) p 573 (Oct)

An illustrated description is given of apparatus used to measure natural frequencies of vibration of machine tools. To be cont. *X* *Pr Qn Vfd W*

A method for pre-determining the maintenance requirement of machine tools. Ein Verfahren zur Vorausbestimmung des Instandhaltungsbedarfs von Werkzeugmaschinen

W. Hartmann. *Industrieblatt* 1960 Vol 60 (10) pp 655-656 (Oct) (In German)

A *Pr.138*

Standardization in the field of machine tools. La normalisation dans le domaine de la machine-outil

Salmon. *Courr Normalis* 1960 Vol 27 (153) pp 273-278 (May-June) (In French)

8 illustr. *A* *Pr.255*

Contribution to the basic technique of automation of simple machines. Contribution à la technique fondamentale de l'automatisation des machines simples

M. Lebrun. *Machine-Outil Française* 1960 Vol 25 (158) pp 121, 123, 125, 127, 129 (Oct) (In French)

10 illustr. *A* *Pr.133*

Note on the measurement of rake angle and relief angle of taps and dies

K. Edensor. *Machinery, Lond* 1960 Vol 97 (2507) pp 1237-1239 (Nov 30)

5 illustr.

D *Tb Uqcc Vfd/Tb Uqcz Vfd*

Predicting surface finishes

R. D. Brown. *Tool & Mfg Engr* 1960 Vol 45 (5) pp 81-82 (Nov)

Accurate prediction of surface finish is said to be possible using equations developed by the author. If speed and ease of solution are more important than extreme accuracy, a graphic method of solution can be used. Only tool radius and feed data are required for solution. 2 illustr. *D* *Unf Vff*

Efficiency in action . . . a pictorial preview of the 1960 Western Tool Show

Anon. *Tool & Mfg Engr* 1960 Vol 45 (5) pp 123-138 (Nov)

Includes sections on grinding and finishing machines and measurement and inspection equipment. Numerous illustrations.

D *Chc Pr.27/Chm Pr.27/Qd W.27/Wb.27*

The ageless diamond. Unvergänglicher Diamant

Anon. *Gold u Silber* 1960 Vol 13 (9) p 34 (Sep) (In German)

This new illustrated booklet tells the story of the diamond from the first diamond engagement ring, given by the Archduke Maximilian of Austria to his bride in 1477, up to the jewellery of the present day.

[Not in library of Industrial Diamond Information Bureau]. *A* *F Kb.28.526*

Coolant performance compared—mist, flood, air

D. Kececioglu, A. Sorensen jun. *Tool & Mfg Engr* 1960 Vol 45 (5) pp 101-106 (Nov)

Significant improvement in metal removal generally results from using mist coolant, but quantitative performance data reveal that flood cooling or dry cutting can provide better performance for certain feed and speed combinations. 6 illustr.

D *Qs Sj*

PUBLICATIONS RECEIVED

BOOK REVIEWS

Cemented [sintered] carbides

P. Schwarzkopf, R. Kieffer, W. Leszynski, F. Benesovsky. Macmillan Co, New York. 1960, 349 pp, illustr, tables, indices. Price £5 5s 0d

The growing technical importance of sintered carbides prompted this comprehensive and up-to-date treatment of the subject. After introductory pages giving background information and describing methods of producing carbides and other metallic refractories, chapters are devoted to mechanical and chemical properties of sintered carbides in commercial production, and those being produced in experimental quantities, *eg* the new oxide and boride cutting materials. The last part of the book concentrates on the applications of these materials to the machine tool, mining, and other industries.

The chapter on testing methods draws attention to the great practical importance of hardness determination. Rockwell and Vickers hardness tests are described and assessed; and micro-hardness measurements on instruments such as the Knoop and the Grodzinski double-conical indenter are mentioned as being particularly satisfactory, since crack formation is minimized even with brittle sintered carbides.

The care needed in grinding and reconditioning carbide tipped tools is stressed; this need is due to their comparatively great brittleness, small thermal conductivity, high hardness, and the need for exact cutting angles. Special diamond or silicon carbide wheels must be used for grinding tips, though shanks may be ground with corundum wheels. Grinding techniques are covered briefly, including the electro-spark process.

D *Al Bkb Chc Nv.52/Bkb Cvd.52/Bkb.21.52*

A glossary of the diamond drilling industry

A. E. Long. US Govt Printing Office, Washington. 1960, US Bureau of Mines, Bulletin 583, 98 pp. Price 35 Cents

Some 5,000 words, terms and symbols are defined in this booklet, which is described as the first glossary ever prepared for the American diamond drilling industry. Representing many years' work by the author and compiled with the help of several experts in the professional and industrial fields, the work is a much-needed attempt to promote a common language among users and makers of diamond drilling equipment. Explanations of specifically geologic, petrographic, and mineralogic language are confined to a few general terms used by diamond drillers. Mining terms are defined only when meanings differ significantly in general mining and diamond drilling practice, while petroleum and churn drilling processes, *etc*, are only explained when they have been adopted by the diamond drilling industry. Purely colloquial expressions are omitted, unless commonly used in the US generally. The emphasis throughout is on clearness and there are helpful cross references. Tables give dimensional characteristics of major classes of drill fittings which would have caused confusion if included among the definitions. Although the glossary is concerned with terms commonly used in the US, it should be of interest to diamond drill users and makers generally and is a useful effort at standardization which would be welcome in other branches of diamonds in industry.

D *Cfb Nh.218.526*

The diamond deposits of Yakutia

A. P. Bobrievich *et al;* ed Gosgeoltekhizdat, Moscow. 1959, 525 pp, illustr, tables. Price 25r 30k. (In Russian)

See *Industr Diam Abstr* 1961 Vol 18 p A2 (Jan).

D *Eb.12.332.52*

DIAMOND TECHNOLOGY

First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 55s 0d, post free.

TRADE LITERATURE

Carbolap wheels a product by Carborundum

Carborundum Co Ltd, Trafford Park, Manchester 17. 4 pp, 5½ × 8½ in., illustr

These wheels are a new product specially designed for off-hand lapping of all classes of tools and tool material. They are described as having a closely-knit fine structure which will produce exceptionally finely-finished edges. Specifications are given.

E *A Chd Pg.57*

UNI diamond wheels

Universal Grinding Wheel Co Ltd, Stafford. 58 pp, 6½ × 9¼ in., illustr

As well as making diamond products for finishing tungsten carbide tools, the company now covers the accurate shaping of tungsten carbide form tools, the internal grinding of tungsten carbide dies, the honing of nitrided and other very hard bores, and the cutting and surfacing of quartz and ceramic materials. This booklet is mainly confined to products included in B.S. 2064 : 1953, dealing with them in four sections : resinoid, metal, vitrified, and electro-metallic bonded. Products are described and specified with photographs.

E *Nv.57*

Unidiamond grain and powder

Universal Grinding Wheel Co Ltd, Stafford. 4 pp, 6 × 9 in. illustr

The company offers diamond grain and powders which are classified to within very strict limits of accuracy and are claimed to be quite free from contamination with coarser or finer particles or badly shaped grains. The products are recommended for use in the manufacture of all types of wire, diamond wheels, preparations, industrial stones, watch stones and jewellery, and work on metals. The range of both grains and powders is listed.

E *Km.57/Kl.57*

PATENT LISTS

BRITISH

The Official Journal (Patents) 1960 (3743) (Nov 9)

857,730 MASSOVIA MASCHINENFABRIK H. FRICKERT GmbH. Spark-erosion machines.

The Official Journal (Patents) 1960 (3744) (Nov 16)

858,743 CORNING GLASS WORKS. Precision grinding.

The Official Journal (Patents) 1960 (3745) (Nov 23)

859,003 SIEMENS-SCHUCKERTWERKE AG. Apparatus for treating metal by electro-erosion.

859,341 AGIE AKTIENGESELLSCHAFT FÜR INDUSTRIELLE ELEKTRONIK. Drives for the electrode in electro-erosively operating machine tools.

858,894 FIDELITONE INC. Method of securing a precious stone in a holding-element.

UNITED STATES

Official Gazette 1960 Vol 759 (1-4) (Oct)

2,954,651 H. H. GEBHART. Attachment for surface grinders.

2,955,030 W. J. BALDWIN, J. L. BLITON, NATIONAL LEAD CO. Polishing compositions.

2,955,031 J. L. BLITON, W. J. BALDWIN, NATIONAL LEAD CO. Glass polishing compositions.

2,955,349 H. E. YORK, GENERAL ELECTRIC CO. Cutting tool.

2,955,390 E. D. PHILIPS. Lens grinding machine or generator.

2,955,391 W. FRED, NORTON CO. Work positioning mechanism for machine tools.

2,955,587 H. SCHICKER. Diamond dressing tool holder.

2,956,377 G. R. WHITE, CENTRAX POWER UNITS LTD. Grinding machine and method.

2,956,378 M. M. ARLIN. Machine tool.

2,956,432 K. E. HENRIKSON, F. B. HENRIKSON. Material hardness detector.

2,956,434 J. K. DONOGHUE, SIMON-CARVES LTD. Apparatus for determining particle size distribution.

2,957,385 J. S. GROSSO, H. A. R. WEGENER, TUNGSOL ELECTRIC INC. Optical crystal alignment.

2,957,471 M. J. KENT, PRECISION GRINDING LTD. Means for trimming grinding or analogous rotary bodies used in grinding or other machines.

SOUTH AFRICAN

Official Journal 1960 Vol 13 (39-43) (Sep-Oct)

60/1319 P. P. J. BARASSIN, CO DE SAINT GOBAIN. Process and devices for producing perforations of very small sections.

60/1495 F. H. FLOTTMANN, K. BISCHOFF, INGENIEURBURO DIPL-ING FRIEDRICH HEINRICH FLOTTMANN. Rock drill with central water-flushing.

60/1555 J. CANTRELL, CARBORUNDUM CO. Abrasive articles and their manufacture.

60/1653 J. HOCHREUTER. Electrical percussion drill with revolving device for the striking tool.

AUSTRALIAN

Official Journal 1960 Vol 30 (33-37) (Sep-Oct)

230,115 MINNESOTA MINING & MFG CO. Non-woven fibrous abrasive article.

SWISS

Patentliste 1960 (18) (Sep)

349,010 R. M. GAGE, UNION CARBIDE CORP. Method and apparatus for machining a workpiece by fusion by means of an electric arc. (Add 342,303).

349,090 R. E. REASON, TAYLOR, TAYLOR & HOBSON LTD. Apparatus for measuring surface irregularities.

349,185 E. FOUQUET. Grinding machine.

349,187 J. R. MacINTOSH, S. A. MERCURIO, INTERNATIONAL PRECISION WHEEL CORP. Grinding wheel.

349,204 H. SERANNE, SOC D'ETUDE ET D'EXPLOITATION DU PALIER FLUIDE (SEEPF). Method of centring and fixing a short piece of fine metal wire axially in the end of a spindle, machine for carrying out this method, and drill-carrying shaft obtained by the method.

349,205 L. FIORITO, GAMBA & FIORITO SpA, CONSTRUZIONI MECCANICHE DI PRECISIONE. Electric drill for drilling stone and hard metal at the highest speeds.

FRENCH

Bulletin Officiel 1960 Vol 1 (41-44) (Oct-Nov)

1,243,926 SA ATELIERS GSP. Precision machine-tool.

1,243,892 GENERAL ELECTRIC CO. Abrasive material and method of preparing it.

1,243,894 GENERAL ELECTRIC CO. Apparatus for producing high pressures at elevated temperatures.

1,243,893 GENERAL ELECTRIC CO. Apparatus for producing high pressures.

1,243,895 GENERAL ELECTRIC CO. Apparatus for producing high pressures at elevated temperatures.

1,243,888 GENERAL ELECTRIC CO. Synthesis of diamond.

1,243,889 GENERAL ELECTRIC CO. Conversion of carbon into diamond.

1,243,890 GENERAL ELECTRIC CO. Method of converting carbonaceous materials into diamond.

1,243,891 GENERAL ELECTRIC CO. Conversion of carbonaceous materials into diamond.

1,243,892 GENERAL ELECTRIC CO. Abrasive material and method of preparing it.

1,243,976 J. F. H. CUSTERS, H. B. DYER, B. W. SENIOR, P. T. WEDEPOHL. Synthesis of diamonds.

73,802/ 1,088,587 SOC D'ETUDE ET D'EXPLOITATION DU PALIER FLUIDE (SEEPF). Drilling device.

1,244,050 NV PHILIPS' GLOEILAMPENFABRIEKEN, PHILIPS PATENTVERWALTUNG GmbH. Method and device for machining, *eg* by severing or cutting slightly conductive substances by means of spark-erosion.

1,244,897 NV PHILIPS' GLOEILAMPENFABRIEKEN. Machine for spark-erosion.

1,244,898 K. BERSTECHER. Abrasive body with a synthetic resin or a ceramic bond.

1,244,728 H. SCHULER. Saw with multiple blades for sawing stones.

1,244,681 T. LINDSLEY. Method of extracting subterraneous materials.

1,244,924 A. J. BENNETT jun, WESTINGHOUSE ELECTRIC CORP. Manufacture of semiconductive crystals.

1,245,148 K. HERTEL. Carbides or Ceramics cutting bodies.

1,245,133 P. WOLTERS. Honing or polishing machine with two upper working disks which can be controlled at will.

1,245,180 W. T. PAULSON, CARBORUNDUM CO. Abrasive products resistant to glazing.

1,245,333 L. COES jun, COMP DES MEULES NORTON. Vitrified grinding wheel and its method of manufacture.

1,245,605 SPERRY GYROSCOPE CO LTD. Lathe for cutting threads.

GERMAN

Patentblatt 1960 Vol 80 (42-45) (Oct-Nov)

Applications Open to Public Inspection

1,091,255 A. LOTZ, SIEMENS-SCHUCKERTWERKE AG. Device for machining workpieces by electro-erosion.

1,091,453 H. G. AMRHEIN, E. LANDECK, FRITZ WENDT KG. Device for working surfaces. (Add 1,042,415).

1,091,454 J. SUNNEN. Honing tool.

1,091,896 K. HULLER, F. GEIGER, KARL HULLER GmbH. Machine for grinding frontal faces.

1,091,958 F. BROTZ, MANNESMANN AG. Drilling crown for drilling coal seams.

1,092,670 R. E. REASON, TAYLOR, TAYLOR & HOBSON LTD. Apparatus for measuring or indicating roughness or waviness of the surface of a workpiece.

IDR REPRINT SERVICE

The following reprints are now available from Industrial Diamond Information Bureau, 2 Charterhouse Street, London EC 1, at a charge of 1s each, post free :

I 256—A film for recording the reactions in the diamond wheel structure, by K. E. Schwartz (*IDR* 1959).

I 257—The grinding technique and its importance for the proper use of carbides in the woodworking industry, by T. Englesson (*IDR* 1959).

I 258—Some growth characteristics of synthetic diamonds : a distinction between natural and synthetic diamond, by S. Tolansky and I. Sunagawa (*IDR* 1960).

I 259—Interferometric studies on synthetic diamonds, by S. Tolansky and I. Sunagawa (*IDR* 1960).

I 260—The use of a new kind of precision micro-sieve for grain-size analysis, by O. Lauer (*IDR* 1960).

I 261—Improvements in diamond drilling and sawing : the effects of soft soap as a wetting agent and softener, by G. B. Dauncey (*IDR* 1960).

GENERAL NOTES

The Industrial Diamond Information Bureau is included in the Diamond Research Organization of Industrial Distributors (Sales) Ltd (incorporated in the Union of South Africa), together with the Diamond Research Laboratory in Johannesburg.

Abstracts

The Bureau prepares abstracts of current scientific and technical literature, including patents, on industrial diamonds and associated subjects. These are published monthly in *Industrial Diamond Abstracts*, which is supplied free to those concerned with the use of diamonds for industrial purposes, and to specialist libraries. The publishers do not claim any copyright in respect of abstracts in this journal. No specific acknowledgement is made to other abstract journals, and no objection will be made to other abstract journals using the contents.

The list of journals (latest issue, September 1955) from which *Industrial Diamond Abstracts* is compiled will be supplied on request.

Library

The Bureau has a Reference Library which seeks to cover world literature on the application and production of diamond tools. It is kept up to date by a careful examination of new publications announced in abstract and technical journals, and covers, in addition to English, German, French and Russian books. The library specializes in technical and scientific pamphlets.

Patent Abstracts

Patent lists are prepared from official patent journals of the major industrial countries, and patent abstracts in general from the printed patent specifications. Printed copies of British patent specifications accepted may be obtained from the Patent Office, Southampton Buildings, London WC 2, at 3s 6d each. Numbers given under British applications for patents are for reference in all correspondence up to acceptance of the complete specification.

The following abbreviations are used :—BP for British Patent, USP for United States Patent, DAS for German Patent Application, DBP for German Patent (GP for German Patents issued prior to 1950), FP for French Patent, Canad P for Canadian Patent, and RP for Russian Patent.

Supply of Literature

1. **Loan Service :** much of the literature abstracted in this journal is available in its original form, and can be borrowed for a period of fourteen days (in Great Britain only). When applying for a loan, please quote the title of the article, the name of the author, and the number of the page on which it appeared. *Do not quote* the coding at the end of an abstract as this is for internal reference only.

2. **Reprints :** copies of certain selected articles on industrial applications of diamond are available and can be supplied on request at a charge of 1s each, post free. New reprints are announced from time to time in this journal, and a classified list of reprints, dated September 1958, is available free on request.

Technical Information

The Bureau offers the resources of its considerable literature holdings to those seeking specific information on diamond tool and similar applications. Problems requiring fuller technical assistance can be referred to the Diamond Research Laboratory, Johannesburg.

Inquiries in connexion with these services should be made to Industrial Diamond Information Bureau Industrial Distributors (Sales) Ltd, 2 Charterhouse Street, London EC 1.

INDUSTRIAL DIAMOND INFORMATION BUREAU

Industrial Distributors (Sales) Ltd, 2 Charterhouse Street, London, EC 1.

LIST OF PUBLICATIONS, JANUARY, 1961

***INDUSTRIAL DIAMOND ABSTRACTS:** issued monthly, from 1944 onwards, about 20 pp, 7⅞ x 9¾ in. Surveys technical, scientific, and patent literature.

***LIST OF PERIODICALS—BIBLIOGRAPHY OF INDUSTRIAL DIAMOND APPLICATIONS:** Alphabetical, 8 pp, 7⅞ x 9¾ in., Sep 1955.

***LIST OF PERIODICALS IN THE INDUSTRIAL DIAMOND INFORMATION BUREAU LIBRARY AT MAY 31, 1958:** Alphabetical, 8 pp, 7⅞ x 9¼ in. A list of periodicals available for loan from the Industrial Diamond Information Bureau Library. This does not replace *List of Periodicals* (above), which is a list of periodicals abstracted in *Industrial Diamond Abstracts*, many of which are not held by the Library.

***IDR REPRINT SERVICE :** Classified, authors' index, subject index of groups, 12 pp, 7⅞ x 9¾ in., Sep 1958. (Reprints 1s each, post free).

***THE DIAMOND RESEARCH LABORATORY:** 16 pp, illustr, 11 x 9 in. Rev ed, 1956.

SELECTED BIBLIOGRAPHIES:

* **Truing of grinding wheels** (from 1910 to 1951). 39 pp, 7⅞ x 9¾ in. 3rd rev ed, Feb 1952.

* **Diamond as cutting tool for metals and non-metallic materials.** 24 pp, 7⅞ x 9¾ in. 2nd rev ed, Nov 1950. Name index, 1951.

Hardness and hardness testing (from 1937 to 1955). 118 pp, name index, subject index, 7⅞ x 9¾ in. 1955-56. Price 5s 6d.

DIAMOND TOOL PATENTS (Patent Monographs)

IA: Machining metals and non-metallic substances, by P. Grodzinski, W. Jacobsohn. 2nd rev ed, 55 pp, 7⅞ x 9¾ in. Apr 1949. Price 10s.

II, IIs: Diamond abrasive wheels, by P. Grodzinski. 74 pp, 4 tables, name index, 7⅞ x 9¾ in. Aug 1948/49. Price 13s 6d.

III, IIIs: Truing of grinding wheels, by W. Jacobsohn. 133 pp, 82 illustr, name index, 7⅞ x 9¾ in. Dec 1948/49. Price £1.

IV: Polishing of gem diamonds, by W. Jacobsohn. 40 pp, 83 illustr, 1 table, name index, 7⅞ x 9¾ in. December, 1950. Price 12s 6d.

IA to IIIs available as compilation in Spirollo binding, price £2 9s.

THE PRINCIPLES AND DESIGN OF A NUCLEAR RADIATION COUNTER WHICH USES A DIAMOND AS ITS DETECTOR, by W. F. Cotty. 18 pp, illustr, 7⅞ x 9¾ in. Oct 1956. Price 2s 6d.

DATA SHEETS FOR THE DIAMOND TOOL DESIGNER AND MAKER—Definition and designation of angles: Comparison of names for tool angles: Plane of chip flow: Clearance and rake angles: Minimum clearance for diamond boring tools: Economic layout of tool tips: Height position of turning tools: Accepted standards. 1945, reprinted Oct 1956. Price 5s

---

* *Publication free of charge.*

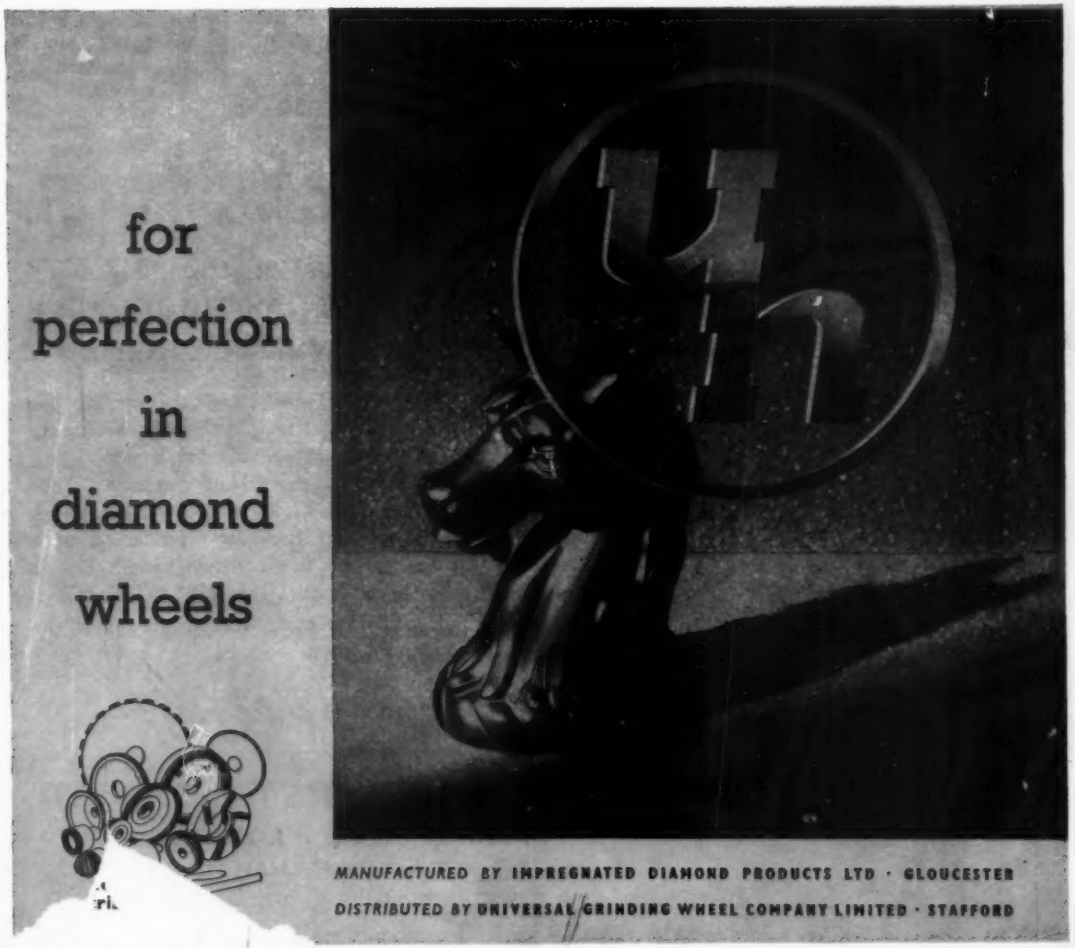
a journal for precision engineers and all users of industrial diamonds and other hard materials

INDUSTRIAL DIAMOND REVIEW

incorporating INDUSTRIAL DIAMOND ABSTRACTS

MONTHLY 1/3 SUBSCRIPTION 15/- A YEAR

January, 1961 Vol. 21 No. 242


for perfection in diamond wheels
MANUFACTURED BY IMPREGNATED DIAMOND PRODUCTS LTD · GLOUCESTER
DISTRIBUTED BY UNIVERSAL GRINDING WHEEL COMPANY LIMITED · STAFFORD